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Final Emvironmental Impact Statement for Southern Region, Palm Beach County Florida Wastewater Facilities

(U.S.) Environmental Protection Agency
Atlanta, GA

Aug 82

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Environmental Protection
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Region 4
345 Courtland Street, NE
Atlanta, GA 30365

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Environmental Impact Statement

Final

Wastewater Facilities Southern Region Area Palm Beach County, Florida

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The Final EIS addresses proposed wastewater facilities for the City of Boca Raton Florida and adjacent areas of unincorporated Palm BEach County. Ten wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface and groundwater resources and the impacts of projected population growth on the natural and human resources of the Southern Palm Beach area.

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FINAL
ENVIRONMENTAL IMPACT STATEMENT
for
SOUTHERN REGION, PALM BEACH COUNTY, FLORIDA

Prepared by
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia 30365

This Final EIS addresses proposed wastewater facilities for the City of Boca Raton, Florida and adjacent areas of unincorporated Palm Beach County. Ten wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface and groundwater resources and the impacts of projected population growth on the natural and human resources of the Southern Palm Beach County area.

Comments and inquiries should be forwarded to:

E.T. Heinen, Chief
Environmental Assessment Branch
Office of Policy and Management
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365
404-881-7901

Approved by

Charles R. Jeter
Regional Administrator

June 25, 1982
Date

EXECUTIVE SUMMARY FOR THE ENVIRONMENTAL IMPACT STATEMENT

Southern Region Area Palm Beach County, Florida Wastewater Facilities

Draft ( )

Final (X)

Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

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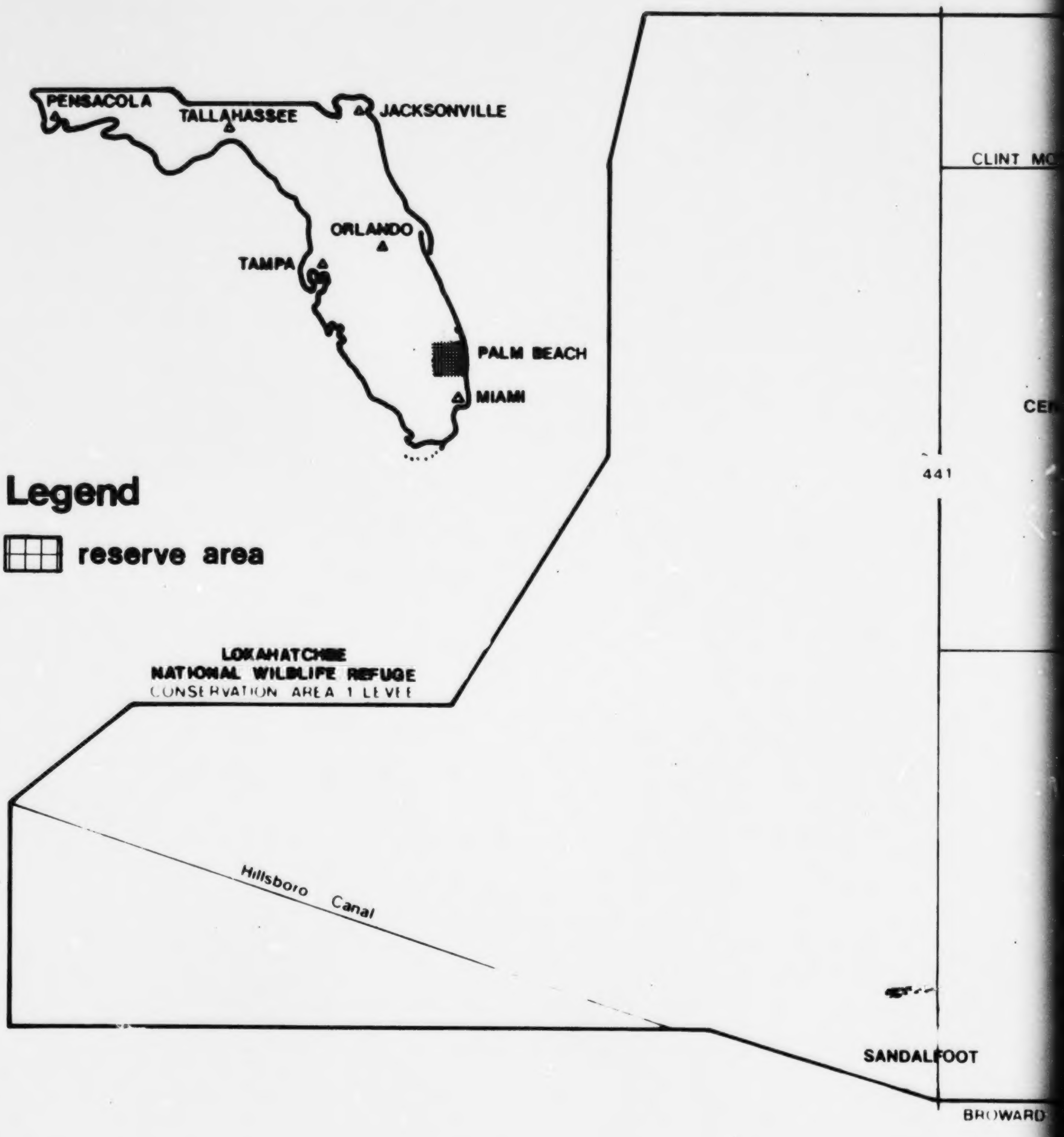
EXECUTIVE SUMMARY

Part A: Need For Action

This environmental impact statement (EIS) addresses alternatives for and impacts of the provision of wastewater management facilities in the the Southern Region Palm Beach County 201 Area. The Planning Area includes the City of Boca Raton and the area of Palm Beach County directly west of the City as shown in Figure 1. This EIS was initiated at the request of the City of Boca Raton which is the lead applicant in this 201 Planning Area. The City was concerned with the impact of projected growth supported by the project in the western portion of the Planning Area upon community services and facilities such as roads, schools, and public beaches. The City has been concerned with the issue of population densities for several years. In 1977, the City sued the County over this issue. The State court ruled in favor of the County land use control authority in its area of jurisdiction.

Most of the land in the County's portion of the Planning Area is classified by the Soil Conservation Service (SCS) as unique agricultural land. The County Land Use Plan supports the conversion of most of this land to urban uses.

Most of the land in the Planning Area is underlain by the Biscayne Aquifer. EPA recently designated the Biscayne Aquifer and its tributaries as a "sole source aquifer" under provisions of the Safe Drinking Water Act.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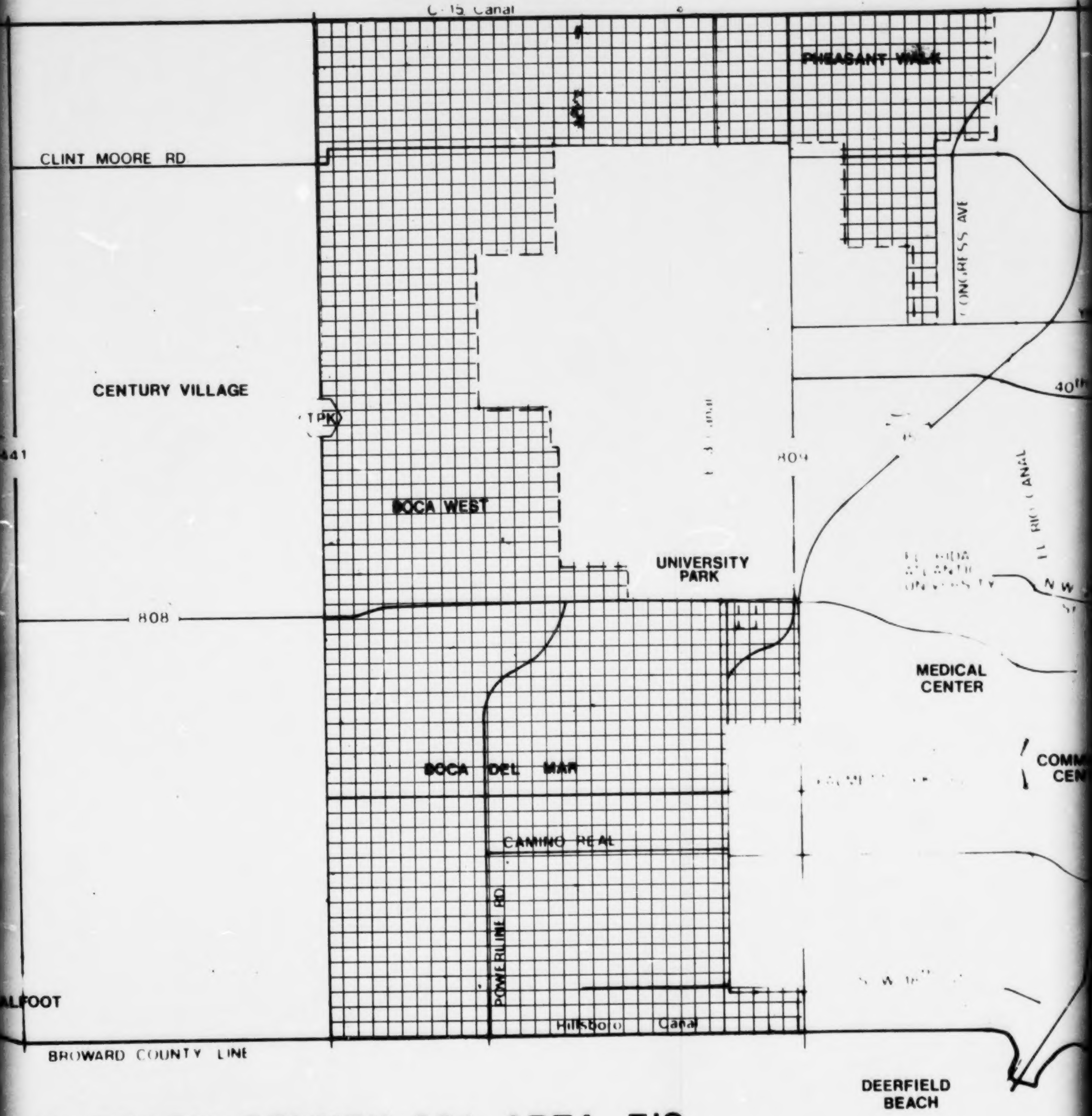
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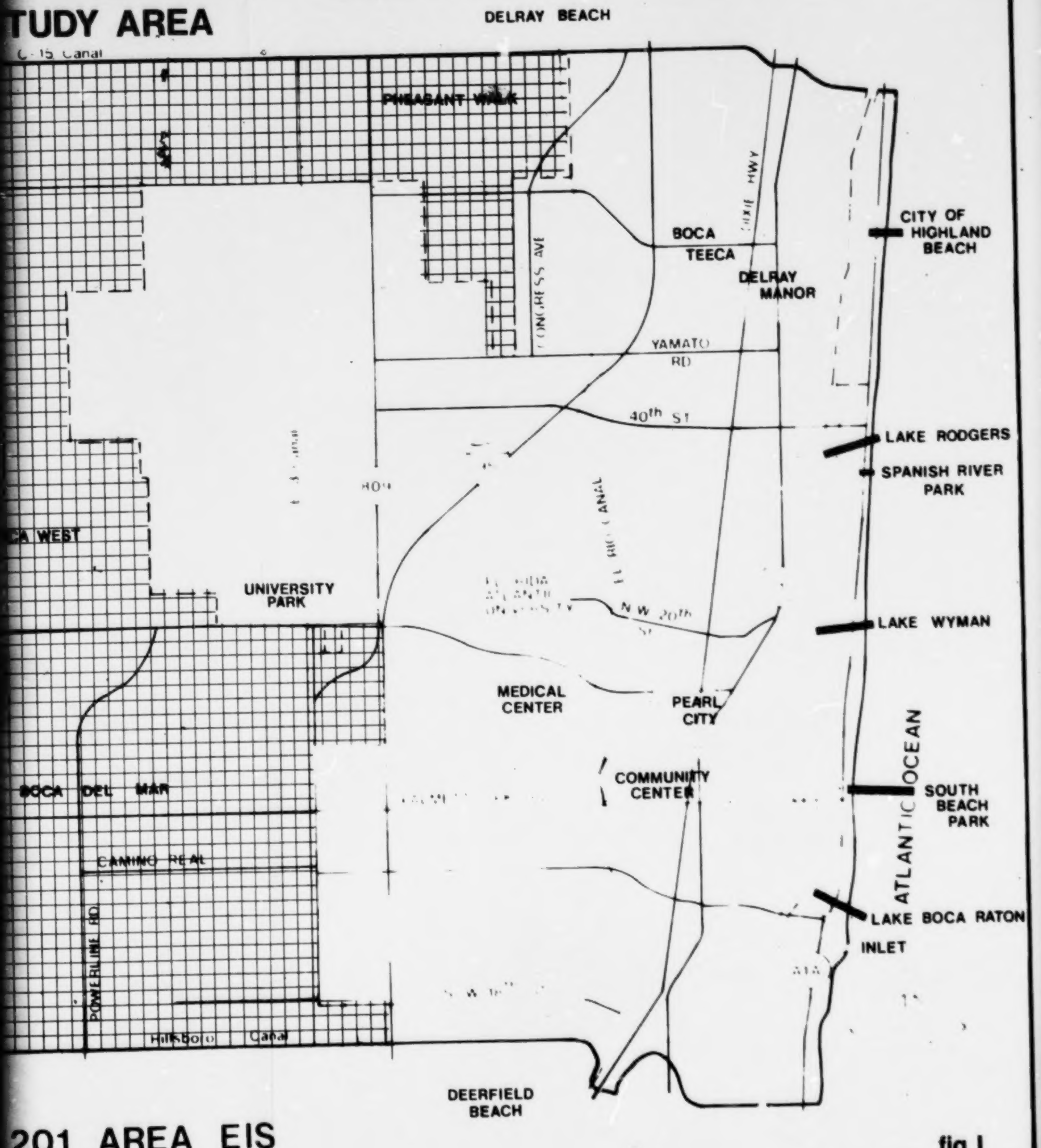
TUDY AREA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INLET
A1A
POWERLINE RD
Hillsboro Canal
DEERFIELD BEACH

201 AREA EIS

fig I

Sewerage facilities which currently service the Planning Area are provided by the City of Boca Raton and Palm Beach County. The area is experiencing extensive growth and development which will soon begin to tax the capabilities of the existing treatment and disposal systems. This EIS addresses the planning undertaken to determine the needed wastewater facilities and their probable impact on the environment.

Part B: Description of Alternatives

Feasible alternatives were developed by combining wastewater service configurations and treatment and disposal techniques. The remainder of this section presents a description of each of the alternatives for wastewater treatement and disposal. Proposed systems for sludge treatment and disposal are addressed in Part I of Chapter 11.

Alternative 1:

Alternative 1 consists of one regional facility with year 2000 capacity of 29 million gallons per day (MGD) located at the existing site of the Glades Road Plant to provide service for the entire Planning Area. This would require an increase of 19 MGD over the current capacity of 10 MGD. An activated sludge process, providing a secondary level of treatment followed by chlorination, would be used. Effluent disposal would be accomplished through the existing ocean outfall.

Alternative 2:

Alternative 2 consists of one regional treatment facility at the site of the Glades Road Plant. This plant would provide service for the entire Planning Area. Effluent disposal would be a combination of ocean outfall and spray irrigation. Based on the screening process performed as part of this study, spray irrigation would be limited to golf courses, parks, and open areas.

Alternative 3:

Alternative 3 consists of one regional facility located at the Glades Road Plant. This plant would provide service to the entire Planning Area except for subbasins F and 1 which would be served by on-site systems. Treatment and disposal would be the same as for Alternative 1 with a decrease in capacity of 2 MGD.

Alternative 4:

Alternative 4 consists of two regional plants. The Glades Road Plant capacity would be increased to 21 MGD from its existing 10 MGD. The treatment and the disposal technique used would be the same as for Alternative 1. This plant would serve subbasins A, B, and F.

A West Regional Plant would be constructed. This plant would employ activated sludge and chlorination attaining secondary treatment. The plant would be designed with a capacity of 9 MGD. Effluent disposal would consist of deep well injection. This plant would serve subbasins C, D, E, I, G, and H.

Alternative 5:

This alternative consists of two regional treatment facilities. One regional treatment facility would be the existing Glades Road Plant expanded to 21 MGD.

A West Regional Plant would also be constructed. Effluent from the plant would be disposed through spray irrigation. Also, the plant would be connected to the Glades Road Plant via a 30-inch outfall. This outfall could transport flow into the Glades Road Plant where it could be ultimately disposed of by ocean outfall. The outfall would serve as a backup to the spray irrigation system proposed for the West Plant.

Alternative 6:

This alternative consists of three regional treatment facilities located at Glades Road, Sandalfoot Cove, and American Homes. Treatment capacity at Glades Road would increase from 10 to 17.5 MGD. Treatment capacity at Sandalfoot would increase from 3 to 6 MGD. American Homes capacity would increase from 1.5 to 6 MGD. Disposal of wastewater from all three treatment facilities would be by ocean outfall. A 30-inch diameter line would be required to convey treated effluent eastward.

Alternative 7:

Alternative 7 consists of one regional plant at Glades Road with the same type of treatment, capacity, discharge, and pumping station configuration as Alternative 1. No centralized service would be provided to the land classified as unique agricultural land. Densities in the other parts of the County service area were assumed to increase so the total population level would be the same as for the other alternatives.

Alternative 8:

This alternative is the no Federal action alternative in which no Federal 201 grant money would be given for construction in the Planning Area. It is estimated that the City and the County would expand the existing facilities in the area with 100% local funding if this alternative is chosen. This would mean expansion of the Glades Road Plant to 17.5 MGD to serve the City's service area. The three County plants would probably remain in service until their capacities were reached between 1988 and 1990. These plants could then be expanded to 6 MGD each at Sandalfoot and American Homes and 0.7 at Pheasant Walk with discharge to percolation ponds or to the City's ocean outfall. A third alternative for the County would be pumping all wastewater to the Glades Road Plant for treatment and disposal. An agreement would have to be reached between the City and County concerning the appropriate option for implementation.

Alternative 9:

Alternative 9 is designed to serve as a potential disposal option which could be used in conjunction with any of the other alternatives. Disposal would be by means of a dual water system for residential irrigation.

Alternative 10:

Alternative 10 consists of constructing a system with configuration, treatment level and type of disposal identical to Alternative 1. The pump station, force main to the Glades Road Plant, and the ultimate size of the treatment plant would be downsized so as not to serve that part of the population projected to settle on unique agricultural lands as defined by the SCS.

Part C: Evaluation of Alternatives

The alternatives described in Part B were evaluated in terms of cost, environmental impact and implementability. The evaluation of the alternatives with respect to these categories is summarized in Table 1.

TABLE I
ALTERNATIVES EVALUATION SUMMARY

Alternative Number	Description of Alternative	Total Present Worth ($millions)	Environmental Effects	Implementability
1	1. 1 plant 2. ocean outfall	26.80	1. No discharges to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. Conversion of most unique agricultural lands to urban uses. 5. Continued and expanded strain on community services & facilities. 6. Not in conformance with County Comprehensive Plan for Subbasins F & I. 7. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to treat & dispose of County wastewater.
2	1. 1 plant 2. ocean outfall & spray irrigation	39.60	1. Continued successful use of the ocean outfall. 2. Some recycling of treated wastewater. 3. Conversion of most unique agricultural lands to urban uses. 4. Continued & expanded strain on community services & facilities. 5. Not in conformance with County Comprehensive Plan for Subbasins F & I. 6. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to treat & dispose of County wastewater.
3	1. 1 plant 2. ocean outfall 3. no service to subbasins F & I	26.80	1. No discharges to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. Conversion of most unique agricultural lands to urban uses. 5. Continued & expanded strain on community services & facilities. 6. This Alternative is in conformance with County Comprehensive Plan recommendation not to serve Subbasins F & I. 7. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to treat & dispose of County wastewater.

TABLE I
ALTERNATIVES EVALUATION SUMMARY

Alternative Number	Description of Alternative	Total Present Worth ($millions)	Environmental Effects	Implementability
4	1. 2 plants 2. ocean outfall & deep well injection	36.25	1. Adverse effects to groundwater undetermined until test well could be implemented. 2. Continued successful use of ocean outfall. 3. Possible recycling of deep well effluent at a later date. 4. Conversion of most unique agricultural lands to urban uses. 5. Continued and expanded strain on community services & facilities. 6. Not in conformance with County Comprehensive Plan for Subbasins F & I. 7. Increased urban runoff to Biscayne Aquifer.	No new agreements or interaction needed between City & County.
5	1. 2 plants 2. ocean outfall & spray irrigation	48.98	1. Continued successful use of the ocean outfall. 2. Some recycling of treated wastewater. 3. Conversion of most unique agricultural lands to urban uses. 4. Continued & expanded strain on community services & facilities. 5. Not in conformance with County Comprehensive Plan for Subbasins F & I. 6. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to dispose of County wastewater.
6	1. 3 plants 2. ocean outfall	34.43	1. No discharges to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. Conversion of most unique agricultural lands to urban uses. 5. Continued & expanded strain on community services & facilities. 6. Not in conformance with County Comprehensive Plan for Subbasins F & I. 7. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to dispose of County wastewater.

TABLE I
ALTERNATIVES EVALUATION SUMMARY

Alternative Number	Description of Alternative	Total Present Worth ($millions)	Environmental Effects	Implementability
7	1. 1 plant 2. ocean outfall 3. no service to agricultural lands	26.80	1. No discharge to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. No more conversions of unique agricultural lands to urban uses. 5. Continued & expanded strain on community services & facilities. The higher densities & decreased sprawl associated with this Alternative will lessen the costs needed to construct additional services & facilities. 6. Increased urban runoff to Biscayne aquifer.	Agreement needed between City & County outlining terms of City agreement to treat and dispose of County wastewater.
8	1. 4 plants 2. ocean outfall & percolation ponds	28.90	1. No Federal funding to service growth & development. 2. No Federal funding to encourage the conversion of unique agricultural lands to urban uses. 3. No Federal funding to encourage increased strain on the area's community services & facilities. 4. Continued discharge to Biscayne Aquifer from percolation ponds. 5. No Federal encouragement of increased urban runoff to Biscayne Aquifer.	No new agreements needed in first phase. Second phase may require agreement by City to treat & dispose of County wastewater.
9	1. Dual water supply system	*	1. Maximum water recycling. 2. Other impacts depend upon what other alternatives this one is supplementing.	Residents may express concern over direct recycle.
10	1. 1 plant 2. ocean outfall 3. no service to agricultural lands	21.80	1. No discharge to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. No funding for conversion of unique agricultural lands to urban uses. 5. The Alternative supports less additional strain on the area's community services & facilities than the full service alternatives.	Agreement needed between City & County outlining terms of City agreement to treat & dispose of County wastewater.

*Exact cost not calculated for Alternative 9. This Alternative includes a distribution system for treated wastewater for residential and other purposes as used in St. Petersburg, Florida. The total costs would exceed those of disposal by ocean outfall or conventional spray irrigation. (supplements ther alternatives)

Cost

As shown in Table 1, there are significant differences among the alternatives with regard to cost ($26.8 million to $48.98 million for the full service alternatives). Alternative 10 costs only $21.8 million. However, this alternative does not provide service for the full 20 year population projection. These figures clearly indicate that the alternatives involving spray irrigation are more expensive than those associated with the outfall. This is due to the high cost of land in the area and the fact that the outfall is already in existence.

Environmental Impacts

Provision of service throughout the unincorporated portion of the Planning Area would promote the conversion of most of the area's unique agricultural lands to urban uses. Alternatives 7, 8 and 10 do not impact these agricultural lands. However, County land use policy supports the conversion of most of these lands to urban uses. It is doubtful that the lack of Federal funds for wastewater treatment and disposal will alter this policy.

The large increases in population levels projected for the Planning Area will lead to increased strain on the already overcrowded system of community services and facilities. County land use policy indicates that these population levels will be reached no matter which alternative is selected. Alternatives 8 and 10 would not provide Federal funding to promote this growth and development.

The Biscayne Aquifer is the principal source of drinking water supply in the area. It has been declared a sole source aquifer under provisions of the Safe Drinking Water Act. Alternative 8 is the only alternative which will maintain the existing percolation ponds discharging into the aquifer. Current monitoring data collected by the Florida Department of Environmental Regulation and the Palm Beach County Health Department as well as EPA's monitoring report presented in Appendix A of this EIS do not indicate any water quality problems associated with these discharges. The large population increase projected for the area will increase the runoff associated with urban land use such as heavy metals, and lawn fertilizers. Runoff from agricultural fertilizers should decrease as more agricultural lands are converted to urban uses.

The demand on the area's potable water resources will continue to expand with the increase in population. Alternatives 2, 4, 5, 8 and 9 involve some form of recycling. The other alternatives discharge all wastewater through the ocean outfall.

Implementability

Most of the alternatives require an agreement between the City and the County outlining terms of Boca Raton's agreement to treat and dispose of Palm Beach County's wastewater. All alternatives require such agreements except Alternatives 4 and 8. It is expected that equitable arrangements could be worked out between these two local governing bodies.

Part D: Description of Preferred Alternative

EPA has selected a modification of the no Federal action alternative, Alternative 8, as the preferred alternative for the Draft EIS. This alternative is shown in Figure II-13. EPA would fund the expansion of the Glades Road facility to 17.5 MGD to serve subbasin A. This alternative would have a present worth cost of approximately $13.2 million.

EPA would not fund any expansion in the County portion of the Planning Area. Capacity currently exists at the Sandalfoot Cove, American Homes, and Pheasant Walk Plants to last until 1988-1990. These plants could then be expanded to 6 MGD each at Sandalfoot Cove and American Homes and 0.7 MGD at Pheasant Walk with discharge to percolation ponds or to the City's ocean outfall. A third alternative for the County would be pumping all wastewater to the Glades Road Plant for treatment and disposal. An agreement would have to be reached between the City and the County concerning the appropriate option for implementation.

Florida DER and the Palm Beach County Health Department will continue their monitoring programs at the percolation ponds and water supply wells in the future. If a buildup of nitrate levels becomes evident, an alternate form of wastewater disposal may become necessary. In this eventuality, Federal funding may be available to address this need.

Part E: Public Participation

In this EIS, the public participation process included the establishment of an Environmental Review Committee, a Technical Advisory Committee, a public scoping meeting, a public meeting on alternatives, and a public hearing on the Draft EIS. A large majority of the input received through this process supported the alternative which was selected as the preferred alternative in this EIS.

The public hearing on the Draft EIS was held in Boca Raton on November 17, 1981. Written comments on the DEIS were received from the following agencies and interested groups:

Federal Agencies

U.S. Department of Interior
U.S. Department of Agriculture: Soil Conservation Service
U.S. Department of Health and Human Services: Public Health Services
U.S. Department of Defense: Department of the Air Force

State Agencies

Office of the Governor of Florida
Florida Department of State
Florida Department of Environmental Regulation

Local Agencies

Palm Beach County
City of Boca Raton

Interested Groups and Individuals

Federation of Boca Raton Homeowner Associates

Part F: Basis for Decision

The underlying theme of this EIS is the selection of a wastewater management program for the Southern Region of Palm Beach County that is compatible with the protection of the area's sensitive resources, particularly the unique agricultural lands and the Biscayne Aquifer, while recognizing the existing extensive development pressure. In light of projected impacts of growth and development in the Planning Area and the demonstrated lack of existing water quality problems, EPA selected the modified no action approach described above as the preferred alternative. Local land use policy is the appropriate means for accomplishing protection and development of the resources in the Planning Area.

FINAL ENVIRONMENTAL IMPACT STATEMENT
SOUTHERN REGION, PALM BEACH COUNTY, FLORIDA

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CHAPTER I - PURPOSE AND NEED FOR ACTION

The Southern Region Palm Beach County 201 Facilities Planning Area Environmental Impact Statement is being prepared to address the provision of wastewater facilities for the City of Boca Raton and a portion of Palm Beach County. Sewerage facilities which currently service the Planning Area are provided by the City of Boca Raton and Palm Beach County. The area is experiencing extensive growth and development which will soon begin to tax the capabilities of the existing treatment and disposal systems. This EIS addresses the planning undertaken to determine the needed wastewater facilities and their probable impact on the environment.

This Planning Area is located on the southeastern coast of Florida as shown in Figure 1. This EIS is being undertaken concurrently with the development of the 201 Plan. Through this process, the two separate consultants are hired to do the EIS and the 201 Plan respectively. The Plans of Study and the two reports were coordinated to avoid duplication. In the alternatives evaluation, the EIS consultant performed the environmental evaluation while the 201 consultant did the cost analysis. The City of Boca Raton, Palm Beach County, the Florida Department of Environmental Regulation (DER) and EPA have all worked together throughout this process to direct the two studies. Major outputs of the 201 Plan are available concurrently with the issuance of this Draft EIS. The Final EIS will be issued with the approval of the completed 201 Plan. The boundaries of the Planning Area were established by the Florida Department of Environmental Regulation. The Planning Area was divided into the County service area and the Boca Raton service area for planning purposes.

The major population center within the Planning Area is the City of Boca Raton. The 1980 population estimate of the City's service area is 62,596. Interceptor and collector systems are present throughout most of the developed portions of this area. Wastewater is treated at the City of Boca Raton's treatment facilities located on Glades Road. This facility provides secondary treatment with the treated effluent discharged into the Atlantic Ocean. Scattered areas in the City are served by septic tanks.

The Palm Beach County service area had a 1980 population estimate of 13,557. Until recently, the South Palm Beach Utilities Corporation (SPBUC) provided most of the wastewater service in this part of the Planning Area with a collection system leading to two small plants both of which provide secondary treatment with discharge to percolation ponds. The County recently purchased the SPBUC and will now operate these facilities along with the Pheasant Walk Plant which also provides secondary treatment with discharge to percolation ponds.

The Palm Beach County Health Department will approve septic tanks at a density of one per acre where a private well is present and one per half acre where no well is present. Scattered homes and low density residential developments throughout the County are served by septic tanks.

The Clean Water Act of 1977, represents the major legislative action for water pollution abatement in the United States. Under this legislation the U.S. Environmental Protection Agency has been given responsiblity for the administration of the law including the funding of wastewater facilities.

The principal mechanism in P.L. 95-217 which provides for the construction of municipal wastewater treatment plants is Section 201. This section provides grant funds for planning, design and construction of wastewater facilities. Under the provisions of Section 201 any wastewater facility which is newly proposed or under consideration for upgrading and/or expanding which will use federal funds for construction must first proceed with a 201 Facilities Planning Study.

In 1978, EPA granted Step I funding for preparation of the Southern Region Palm Beach County Area 201 Facilities Plan. The City of Boca Raton has been coordinating the 201 Facilities Plan for the Planning Area. Camp, Dresser, & McKee of Fort Lauderdale, Florida is preparing the 201 Plan.

EPA made the decision to prepare an EIS in conjunction with the 201 Facilities Plan for several reasons. These reasons included a request by the City of Boca Raton and the potential adverse impacts of projected population and development. Stottler & Stagg was authorized to begin preparation of the EIS in February, 1979.

This EIS is being done to comply with the provisions of the National Environmental Policy Act of 1969, Public Law 91-190. The purpose of this act is to encourage all Federal agencies to direct their policies, plans, and programs to protect and enhance environmental quality. To comply with this Act, Federal agencies, in consultation with the public and other Federal, State, and local agencies, will assess in detail the potential environmental impacts of all major Federal actions significantly affecting the quality of the human environment.

The objective of the EIS and 201 Facilities Plan process is the selection of the most cost-effective, environmentally sound, socially acceptable and implementable wastewater management system for the Planning Area. To meet this objective, certain major goals were determined to be significant.

1. Preservation of the area's unique natural resources.
2. Implementation of the Florida Local Government Comprehensive Planning Act throughout the Planning Area.
3. Ensure that water quality standards are achieved and prevent any further degradation of surface water quality.
4. Protection of potable water supplies.
5. Ensure the availability of adequate public facilities and services for future populations.
6. Reuse of treated wastewater.
7. Maintenance of the quality of life.
8. Avoidance of undue financial burden on the community.
9. Increase cooperation among Federal, State, and local units of government within the Planning Area.

Public participation was encouraged throughout the 201 planning process through the establishment of an Environmental Review Commmittee, public meetings, and local news coverage. The Review Committee included representatives of all local governments, environmental groups, regional regulatory and planning agencies and private citizens. Meetings of the Review Committee were held at key intervals in the planning process and committee members were provided with a series of Task Reports which presented detailed information on principal parts of the study. Following the selection of a recommmended plan, a public meeting was held to afford interested citizens an opportunity to comment on the plan.

CHAPTER II - ALTERNATIVES DEVELOPMENT AND COST EVALUATION

Part A: Introduction

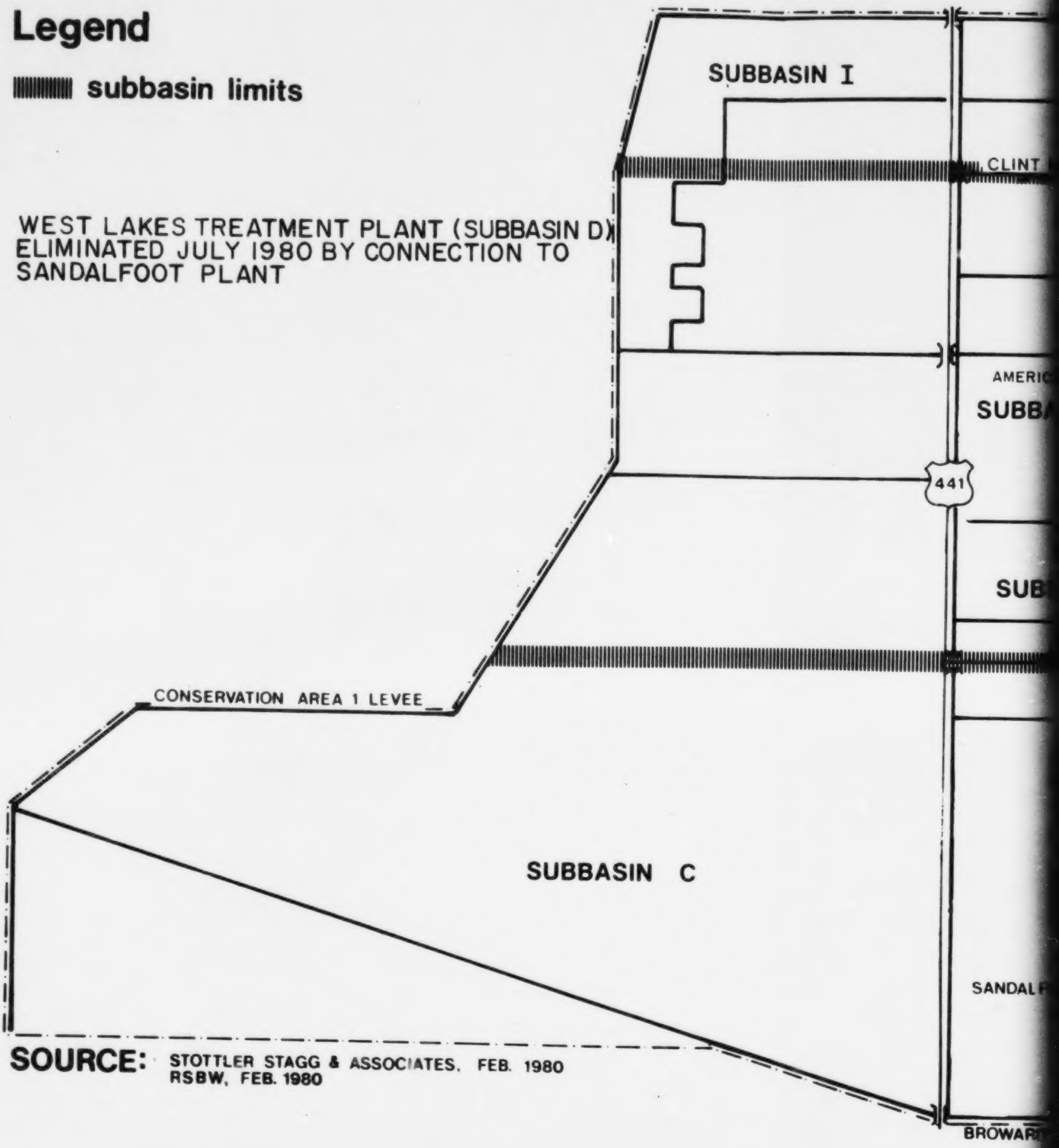
The purpose of this chapter is to provide a systematic development of all reasonable alternatives for the attainment of the objectives of this project. The alternatives are then compared and critical differences identified. A preferred alternative is then selected.

This chapter presents a range of structural engineering alternatives and non-structural considerations for the solution of wastewater management problems. In addition, alternatives are evaluated for their relative cost and implementability. The environnmental evaluation of the alternatives is presented in Chapter III. The structual alternatives identified include the construction of new wastewater treatment and conveyance facilities or the upgrading of existing facilities. Non-structual wastewater considerations discussed include optimum use of existing facilities, flow and waste reduction measures, land and development controls.

EPA regulations require the use of population projections developed and approved for the Areawide Wastewater Management Plan (208 Plan) in the 201 planning process. Projections made in April, 1979 have been approved by the City, County, FDER and EPA. These projections indicate that the total population within the Planning Area will increase from 76,153 in 1980 to 257,566 in 2000. These projections have been disaggregated to the service area subbasins shown in Figure II-1 for the purpose of developing flow projections. The per capita flow projections to be used are 89 and 100 gallons per capita per day (gpcd) for the areas east and west of the Turnpike, respectively. Total wastewater quantities estimated for the year 2000 are approximately 18 MGD in the Boca Raton service area and approximately 10 MGD in the County service area.

The needs and expenditures for wastewater facilities could be substantial and, therefore, many technically feasible alternatives were evaluated for immediate and future requirements throughout the planning period.

All potential alternatives were evaluated based on capital and annual costs. The costs evaluations identified several cost-effective alternatives for the Boca Raton service area and the County service area. The cost-effective alternatives were evaluated further with respect to overall economic, environmental, and administrative and implementative characteristics to select the recommended plan.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WEST LAKES TREATMENT PLANT (SUBBASIN D)
ELIMINATED JULY 1980 BY CONNECTION TO
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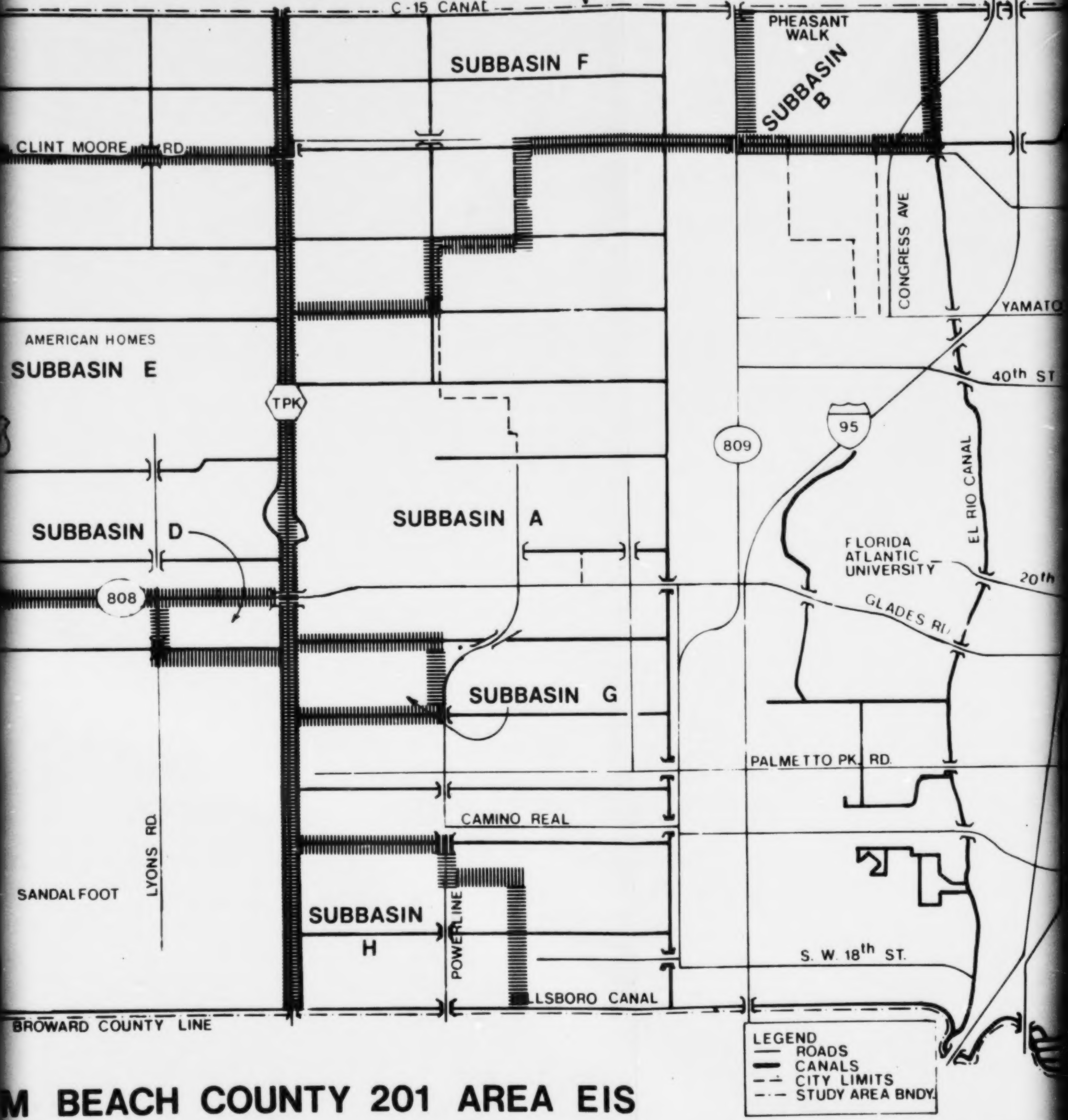
SUBBASIN C
SANDALF
BROWARD

SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

SOUTHERN REGION PALM B

SUBBASIN BOUNDARIES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SUBBASIN A
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CAMINO REAL
LYONS RD.
SANDALFOOT
SUBBASIN H
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CANALS
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M BEACH COUNTY 201 AREA EIS

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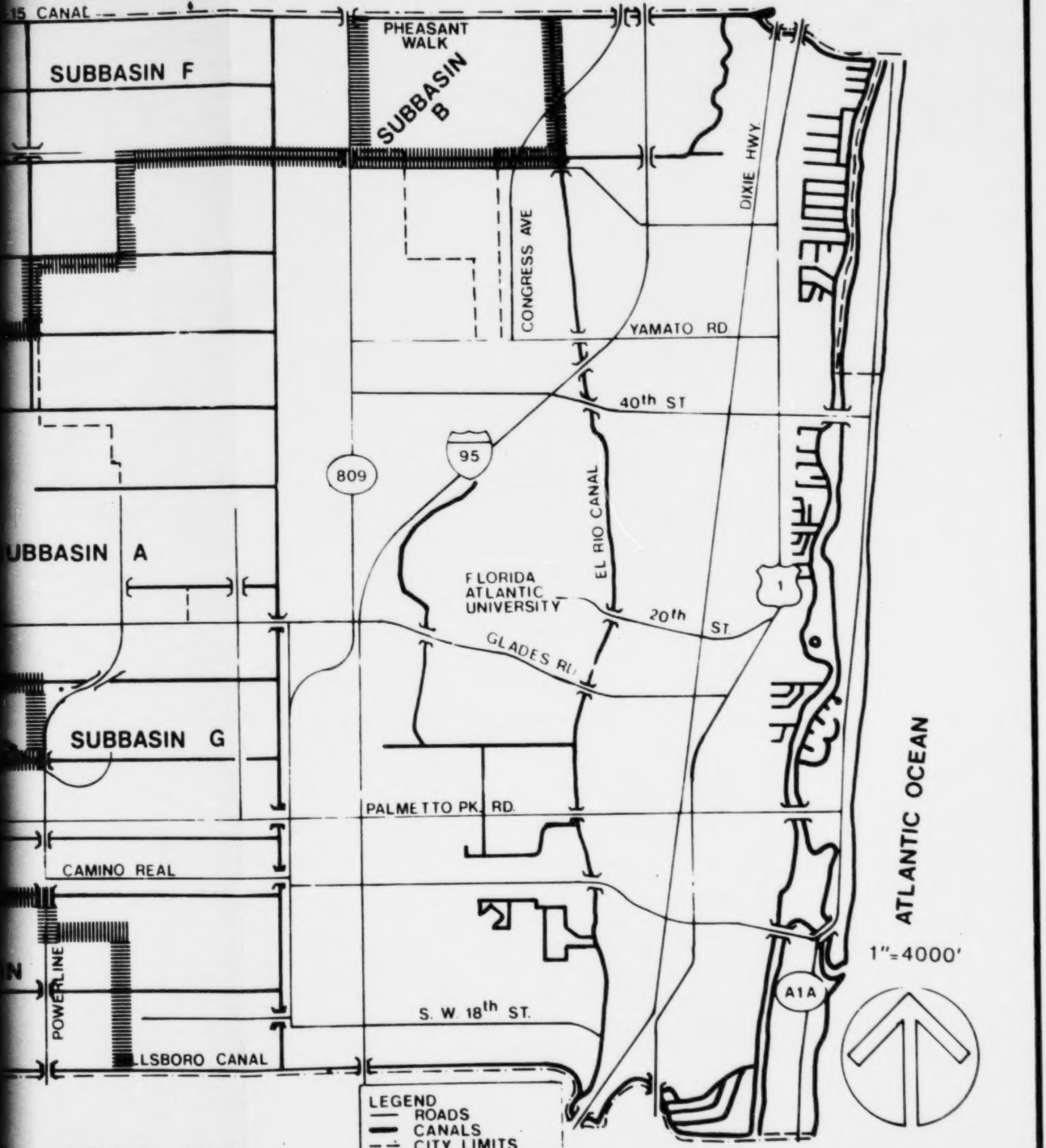
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fig II-1

Part B: Identification and Development of Wastewater Service Configurations

The Planning Area was divided into three service areas consisting of the Boca Raton service area, the Palm Beach County service area west of Boca Raton, and the Pheasant Walk service area which is also operated by Palm Beach County.

Large portions of the Boca Raton service area (subbasin A) are currently served by wastewater collection and treatment facilities. The Glades Road Plant has a current capacity of 10 MGD and provides secondary treatment with discharge by ocean outfall. Because of the extent of the existing collection and treatment facilities, no other service configurations were developed for the Boca Raton service area.

Portions of the Palm Beach County service area west of Boca Raton (subbasins C, D, E, F, G, H, and I) are currently serviced by a collection system and two small treatment plants providing secondary treatment with discharge to percolation ponds. Treatment configurations developed for this area include continued use of the existing facilities, construction of pumping stations at the existing plant sites with construction of a force main to the Glades Road Plant for treatment and construction of two new plants in the area.

The Pheasant Walk service area (subbasin B) is currently served by a small treatment plant providing secondary treatment with discharge to percolation ponds. Treatment configurations considered for this service area include continued use of the existing facilities and pumping to the Glades Road facility for treatment.

Part C: Identification of Applicable Treatment and Disposal Methods

Treatment and Discharge to Surface Waters

Wastewater treatment and discharge to surface waters is the most commonly used wastewater management technique. It consists of treating wastewater by a combination of physical, chemical and/or biological processes and discharging the effluent to surface waters via an ocean outfall.

The City's Glades Road Plant discharges secondary treated effluent to the Atlantic Ocean. EPA has identified no significant problems resulting from the operation of this outfall or any of the other ocean outfalls in southeast Florida. No other surface waters in the area were considered to be viable as surface water discharge alternatives.

Treatment and Discharge By Land Application

Land application of treated wastewater provides for further removal or reduction of pollutants by physical and/or biological processes which occur in the soils. The successful operation of a land application system is dependent upon the characteristics such as soil structure and chemistry, topography, geology, hydrology, climate and vegetation. The land-treated wastewater is removed from the soil by evapotranspiration and is returned to surface streams by runoff or percolates downward through the soil to the groundwater.

Land treatment of wastewater is a broad term that can be broken down into three prinicipal processes. These processes are as follows:

- Slow Rate
- Rapid Infiltration
- Overland Flow

Comparison of design features and site characteristics for each of the processes are tabulated in Table II-1. The major difference between slow rate and rapid infiltration processes is principally in the rate of application. Rapid infiltration application rates are in the order of ten to thirty times the application rate of a slow rate system.

TABLE II - 1

COMPARISON OF DESIGN FEATURES FOR LAND TREATMENT PROCESSES

FEATURE	PRINCIPAL PROCESSES		
	SLOW RATE	RAPID INFILTRATION	OVERLAND FLOW
Application techniques	Sprinkler or surface[a]	Usually surface	Sprinkler or surface
Annual application rate, ft.	2 to 20	20 to 560	10 to 70
Field area required, acres[b]	56 to 560	2 to 56	16 to 110
Typical weekly application rate, inches	0.5 to 4	4 to 120	2.5 to 6[c] 6 to 16[d]
Minimum preapplication treatment provided in United States	Primary sedimentation[e]	Primary sedimentation	Screening and grit removal
Disposition of applied wastewater	Evapotranspiration and percolation	Mainly percolation	Surface runoff and evapotranspiration with some percolation
Need for vegetation	Required	Optional	Required

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[a] Includes ridge-and-furrow and border strip.

[b] Field area in acres not including buffer area, roads, or ditches for 1 Mgal/d (43.8 L/s) flow.

[c] Range for application of screened wastewater.

[d] Range for application of lagoon and secondary effluent.

[e] Depends on the use of the effluent and the type of crop.

1 inch = 2.54 cm
1 foot = 0.305 m
1 acre = 0.405 ha

SOURCE: EPA Process Design Manual for Land Treatment of Municipal Effluent

Overland flow application rates are about one to three times the application rate of a slow rate system. A conventional overland flow system uses mildly sloping land and vegetation as its prinicipal tools. Treatment is rendered by the vegetation as wastewater flows "over the land". A minor portion of the wastewater is lost to percolation into the soil and evapotranspiration, however, most of the flow is usually collected and then disposed of by appropriate methods. Slow rate and rapid infiltration systems, on the other hand, rely on percolation through the soil for treatment. Percolating water may augment the groundwater supply or meet the consumptive demands of crops being grown.

Slow rate infiltration is generally accomplished by the spray irrigation of effluent. This technique applies treated wastewater to a vegetated area where a portion of the water is treated as it percolates slowly through the soil to the groundwater table, while the remainder of the water is removed by evapotranspiration. Soil conditions within the Planning Area generally appear to be adequate to warrant investigating the possibility of using spray irrigation slow rate land application systems to meet wastewater treatment needs of the Planning Area.

Percolation ponds are a means of land application of wastewater which is used in this Planning Area. When this technique is used, treated wastewater is disposed of into a large unlined pond and gradually percolates into the surrounding groundwater. Little or no treatment is accomplished in the soils utilizing this method of disposal.

On-site and community systems are also alternatives which discharge by land application. These systems include:

- Septic Tank/Soil Absorption Systems
- Aerobic Treatment/Absorption Bed
- Septic Tank/Mound System
- Septic Tank/Evapotranspiration System
- Pressure Sewers
- Vacuum Sewers
- Small Diameter Gravity Sewers

All individual, and on-site systems have been identified as Alternative Technology by current Federal guidelines. Under the Individual Systems Regulation (CFR 35.918-1, 35.918-2, 35.918-3) individual and on-site systems are eligible for a 4 percent set aside of state funding allocations by EPA. In addition, on-site systems are eligible for 85 percent funding because they are identified as alternative technology.

The use of on-site or community systems is most commonly seen in smaller communities or lower density areas in larger communities. This results because the cost to the individual homeowner is generally less for on-site systems in less densely populated areas. However, costs are not the only constraints used to define the feasibility of community and on-site systems. Constraints used to assess the feasibility of community and on-site systems are:

- o Siting restrictions in terms of terrain
- o Total System Cost
- o System performance including removability and reliability

Deep Well Injection

Another possible means of wastewater disposal is deep well injection. Deep wells require no discharge to surface waters and are a potential means of water reuse in the future. The main problem with deep well injection is that until a well is actually drilled and tested it is unknown if a suitable injection zone exists; thus making the technique very costly.

Part D: Identification of Applicable Methods of Disinfection

Chlorine

Chlorine is a common disinfecting agent that has widespread use in water and wastewater treatment. However, recently there has been a resurgence of concern about the toxic potential of certain by-products of chlorination. These by-products are formed when trace organics combine with chlorine. The most widely publicized compounds of public health concerns are the trihalomethanes. As a result of this knowledge, alternative disinfectants have been evaluated.

Chlorine is reported to be an effective bacteriacide under most conditions. When chlorine is dissolved in water it can undergo various transformations. It first disassociates into acid forms, known as hypochlorous and hydrochloric. The hypochlorous form is considered to be the most effective disinfectant. Other forms which are not as efficient in disinfecting are hypochlorite and chloramines. Chloramines are compounds of chlorine and ammonia present in solution.

Research has shown that with the exception of one species of virus, it takes 3-10 times more chlorine to kill viruses than common pathogenic bacteria. In general, the inactivation rate of viruses by chlorine increases with time of exposure, lower pH (6.0 or less), and increase in temperature.

Of further concern is the recent knowledge that chlorine by-products and naturally occuring organic acids combine to form detrimental by-products. The first concrete evidence of these by-products, called trihalomethanes, surfaced in New Orleans in 1974. It was concluded in subsequent studies that trihalomethane formation was a direct result of chlorination of waters. Trihalomethane formation is occasionally of concern where prechlorination of wastewater brings chlorine compounds into contact with high concentrations of organic materials. Post chlorination of effluent is not considered to be a significant problem except in cases of direct recycling of wastewater as a drinking water supply with little or no dilution.

Costs for utilizing chlorine vary based on geographical area and many other factors. In general, however, chlorine is more economical if purchased in large quantities. For example, the approximate cost of chlorine varies from 11 cents per pound to 5 cents per pound for ton cylinder systems and tank car systems, respectively. These cost estimates are based on January 1976 cost figures.

Ozone

Ozone is another compound that can act as a disinfecting agent in water and wastewater although its use for disinfecting purposes has not been as common in the United States. Europe and Canada have had much more experience with ozone disinfection. According to the 201 Plan, there are almost 1,000 installations in Europe using ozone for disinfection of water.

Ozone is a very unstable compound and it is therefore very difficult to store. As a result, it becomes necessary to produce it on-site. Since its first use at the turn of the century, ozone generation has become reliable and much more economical.

Ozone is a very powerful disinfectant and strong oxidizing agent and there is no doubt of its superiority over chlorine as a viricide, even when employed against resistent strains. Besides being a very good viricide, ozone can oxidize organic compounds and reduce color and odor. Reportedly, ozone has been found to oxidize phenol and remove nitrate.

Advantages of using ozone are its effective viricidal and bacteriocidal quality, its ability to oxidize organic compounds, and its residual-free decomposition. Unlike chlorine, ozone decomposes rapidly but leaves no residuals except dissolved oxygen.

The disadvantages of using ozone are also reported in the literature. One disadvantage is the inability to rapidly check its effectiveness. Unlike chlorine, analytical methods for ozone are not specific or sensitive enough to control the feeding of this chemical with a relatively high degree of accuracy.

Another disadvantage of using ozone is the difficulty encountered when trying to compensate ozone feed rates to the variations in ozone demand. Also, solubility of ozone decreases when temperature and humidity are high because of the inherent characteristics of the production process. Because of its very unstable nature, ozone does not provide residual disinfecting action when utilized as a water or wastewater disinfectant. It is reported that the half-life of ozone under general conditions is about 20 minutes. Therefore, no lasting residual disinfecting action can be expected when using ozone.

Capital and operating costs for ozone, as well as electrical energy requirements for on-site production are somewhat higher than for using chlorine and thus make chlorine more cost effective under most conditions. As an example, the total energy requirements for chlorination is about 30 kilowatt hours per million gallons. On the other hand, the total energy requirements for ozone production is about 550 kilowatt hours per million gallons.

Iodine

Iodine is an alternative disinfectant to the commonly employed chlorine and ozone. Iodine is less reactive with organic compounds so it is considered more stable in low residual concentrations. The advantage of this characteristic is that the products of organics with other disinfectants produce odors, whereas iodine does not. There are reports of iodine imparted taste in concentrations as low as 1.5 to 2.0 mg/l, but it is reported as unobjectionable.

Iodine's bacteriocidal action has been found somewhat inferior to chlorine under controlled conditions. However, with respect to higher organisms such as cysts and spores, iodine exhibited very good disinfecting power. Quick destruction of cysts and spores has been reported in waters with iodine concentrations of 5-10 mg/l.

When compared to chlorine, the baseline of disinfectants in the field, iodine has one marked advantage. Namely, its failure to react with nitrogen compounds such as ammonia, does not rob it of its effectiveness as a viricide or bacteriacide. However, it is unlikely that it could substitute for chlorine because of its higher cost and restricted availability.

Bromine

Bromine is another halogen that is considered a disinfectant in water. It exhibits chemical characteristics like that of chlorine. For example, it hydrolizes to acid forms and reacts with ammonia to form bromamines. Its bacteriacidal capability has been found similar to chlorine. Unlike chloramines, however, bromamines do not create toxic conditions in fish laden waters.

In spite of these advantages, it is unlikely that bromine can substitute for chlorine as a disinfectant in treatment facilities because of its greater cost and its lesser availability. In addition, there have been no large scale projects implemented to test the use of bromine.

Part E: Non-Structural Wastewater Management Systems

Flow and Waste Reduction

The use of water conservation and flow reduction techniques is an important non-structural technique. Where a treatment plant is already overloaded, a reduction in wastewater flows could significantly improve wastewater treatment.

The reduction of flows could have several effects upon a community's wastewater system. First, treatment could be improved with reduced flows. Secondly, the community could possibly avoid the cost of constructing a new or expanded treatment plant with the reduction of flows into the existing plant or prolong the design life of plants presently being designed or constructed.

Domestic sewage production may be decreased by certain techniques for reducing water consumption which evolved over the past several decades. Increasing water costs may be expected to induce such conservation of water by residential users; however, most of the reduction in consumption will be limited to residential uses such as lawn watering and car washing, which will not affect the overall sewage flows.

Concern about adequate water supply and water conservation has led to the development of numerous devices for reducing residential water usage. Included are such items as toilets which require considerably less water for flushing and shower hands which need less flow to produce the same washing and rinsing effects.

Reduced wastewater production by water conservation should continue to be encouraged. Reduction of the volume of wastewater, however, will have little effect on the quantity of waste constituents.

Land Use and Development Controls

Land use controls which provide for planned development may limit potential adverse impacts on water quality (and other environmental amenities) from uncontrolled growth. Limiting the density of development or preventing development within unique agricultural lands are specific applications of this type of control.

In order to effectively plan and manage land use there are a variety of land management tools and techniques that are available to the local governments in the Planning Area. These techniques include:

- Comprehensive plans.
- Zoning ordinances.
- Subdivision and land development regulations.
- Easements.
- Fee simple acquisition of land.
- Staged growth policies.
- Conservation zoning district.
- Model zoning ordinance.
- Transfer of development rights.

Land use control mechanisms may be of limited use in the Palm Beach County portion of the Planning Area since extensive development approvals have already been given at the local level.

Part F: Development of Alternatives

Initial alternatives were developed by combining wastewater service configurations and treatment and disposal techniques as discussed earlier in this chapter. This section presents a description of each of these alternatives. A more detailed analysis can be found in the South Palm Beach County Facility Plan, Third Interim Submittal.

Alternative 1:

Alternative 1 consists of one regional facility with year 2000 capacity of 29 MGD located at the existing site of the Glades Road Plant to provide service for the entire Planning Area. This would require an increase of 19 MGD over the current capacity of 10 MGD. An activated sludge process, providing a secondary level of treatment followed by chlorination, would be used.

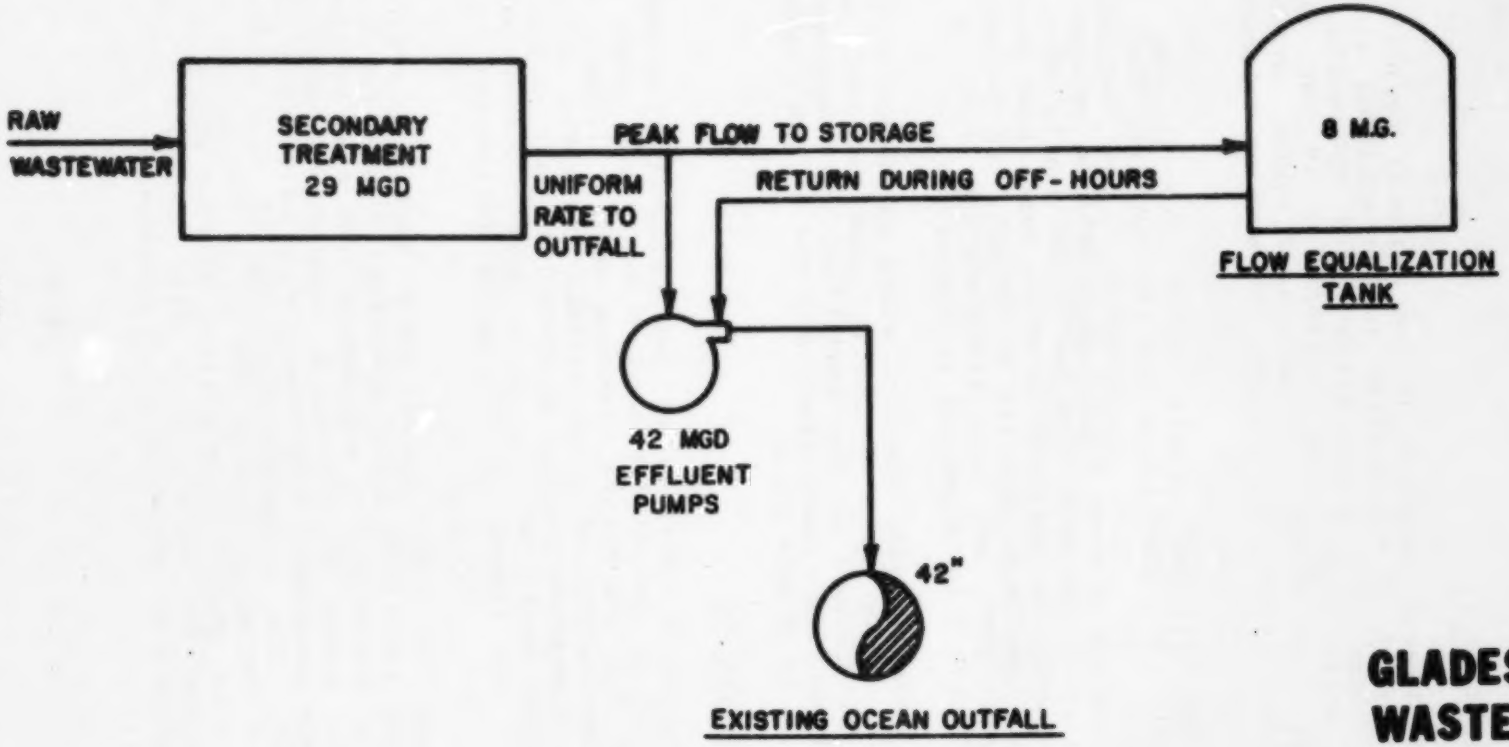
Effluent disposal would occur through the existing ocean outfall. To effectively use the outfall, flow equalization is proposed for this alternative. The estimated volume of equalization storage needed is 8 million gallons. However, two tanks would be used with equal or nearly equal volume. This volume would be utilized to store peak flows beyond the plant's planned treatment capacity of 29 MGD. Projected peak flows for the year 2000 are approximmately 56 MGD. A schematic for Alternative 1 is presented in Figure II-2.

Three regional pump stations would be needed to pump wastewater to the Glades Road facility. One regional pumping station would be located at the Sandalfoot Cove Wastewater Plant, one at the American Homes Plant and one at the Pheasant Walk Plant as shown in Figure II-3.

Alternative 2:

Alternative 2 consists of one regional treatment facility at the site of the Glades Road Plant. This plant would provide service for the entire Planning Area. Effluent disposal would be a combination of ocean outfall and spray irrigation. Based on the screening process performed as part of this study, spray irrigation would be limited to golf courses, parks, and open areas. The layout of the spray irrigation is as shown in Figure II-4.

Treatment at the Glades Road facility would consist of secondary treatment using activated sludge for that portion of the flow discharged to the ocean. For that portion of the flow used for spray irrigation, a treatment process consisting of secondary treatment plus coagulation-filtration-chlorination is proposed. The treatment capacity of the Glades Road Plant would be increased from 10 MGD to 29 MGD by the year 2000. An equalization volume of 8 million gallons would be used in this alternative to dampen peak flow rates. A schematic for Alternative 2 is presented in Figure II-5.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WASTEWATER
SECONDARY
TREATMENT
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PEAK FLOW TO STORAGE
UNIFORM
RATE TO
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SCHEMATIC FOR ALTERNATIVE I

**GLADES ROAD
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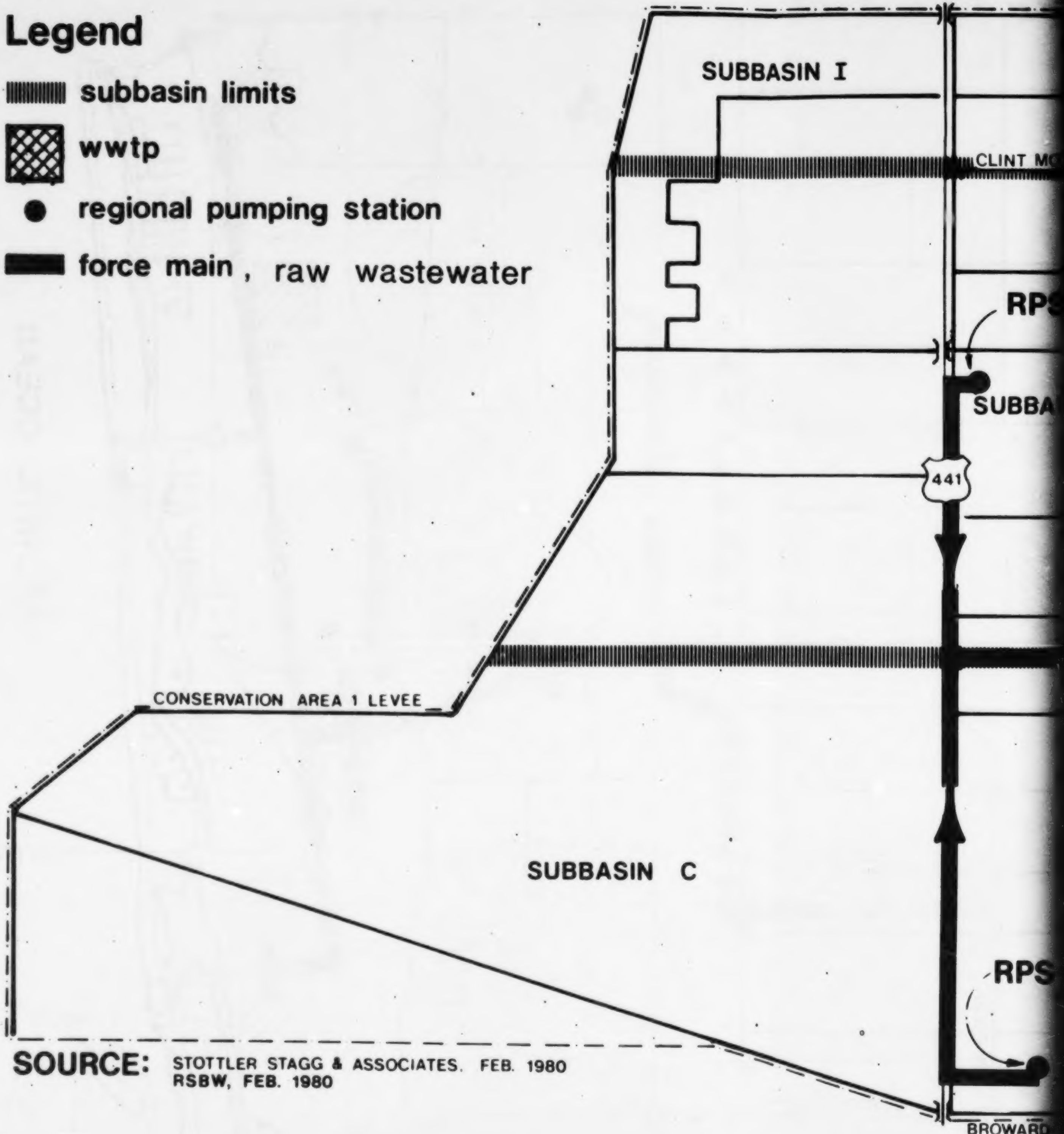
FIGURE II - 2

WASTEWATER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SOURCE: STOTTLER STAGG & ASSOCIATES. FEB. 1980
RSBW, FEB. 1980

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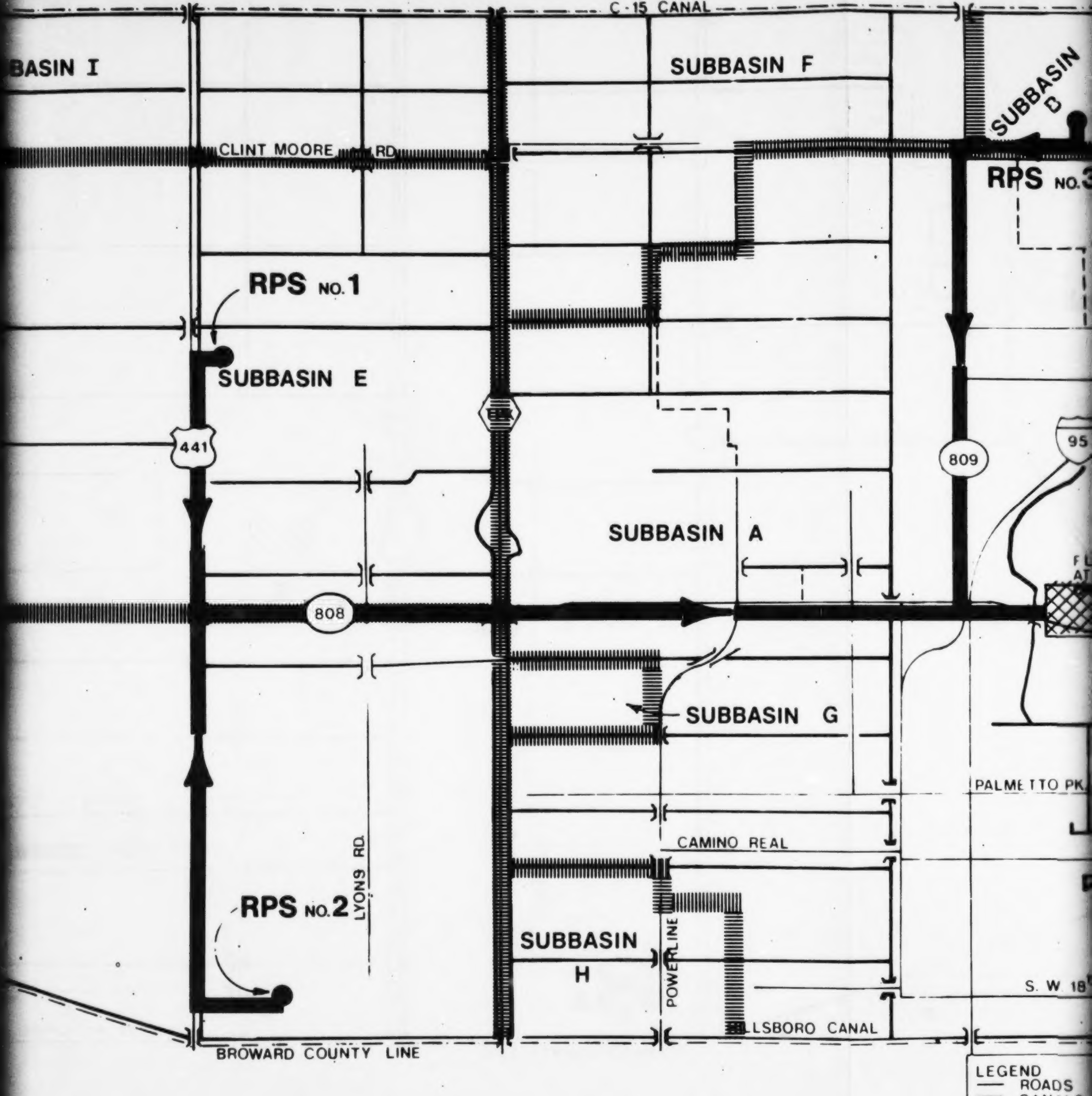
WASTEWATER TREATMENT SYSTEM - ALTERNATIVE 1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STEM - ALTERNATIVE 1

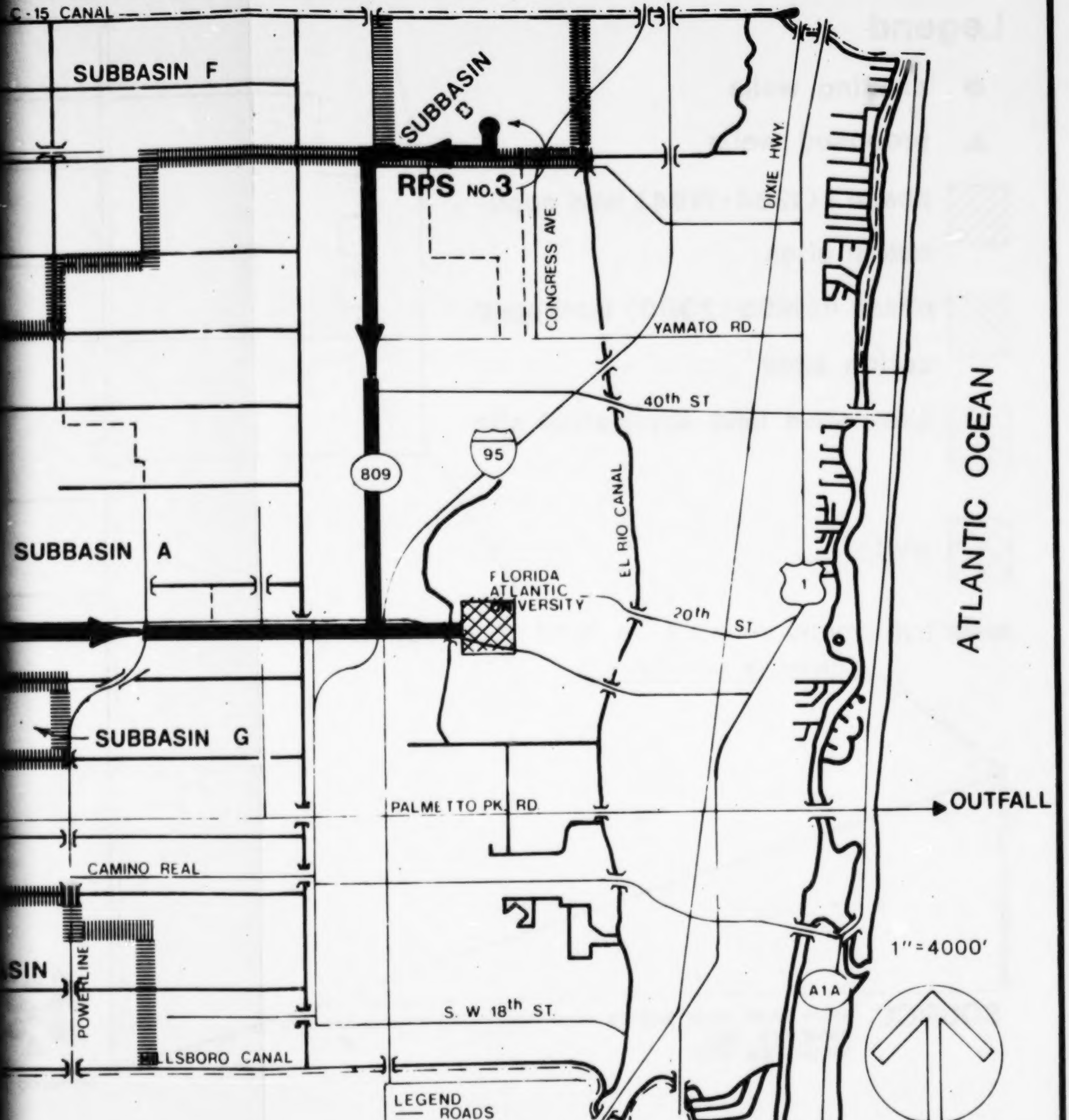
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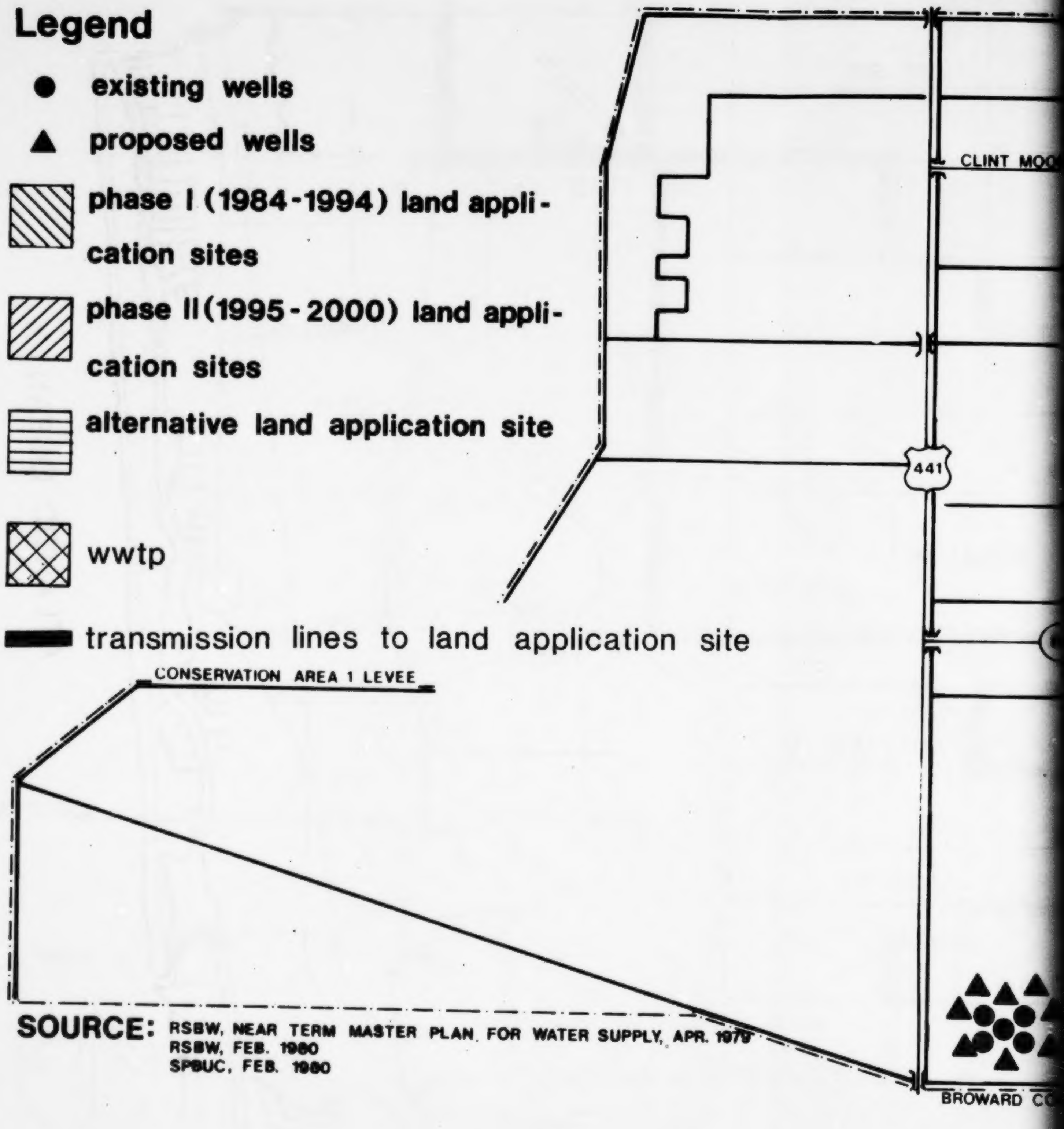
fig II-3

LAND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▨ phase II (1995-2000) land application sites
▤ alternative land application site
▩ wwtp
▬ transmission lines to land application site
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SOURCE: RSBW, NEAR TERM MASTER PLAN FOR WATER SUPPLY, APR. 1979
RSBW, FEB. 1980
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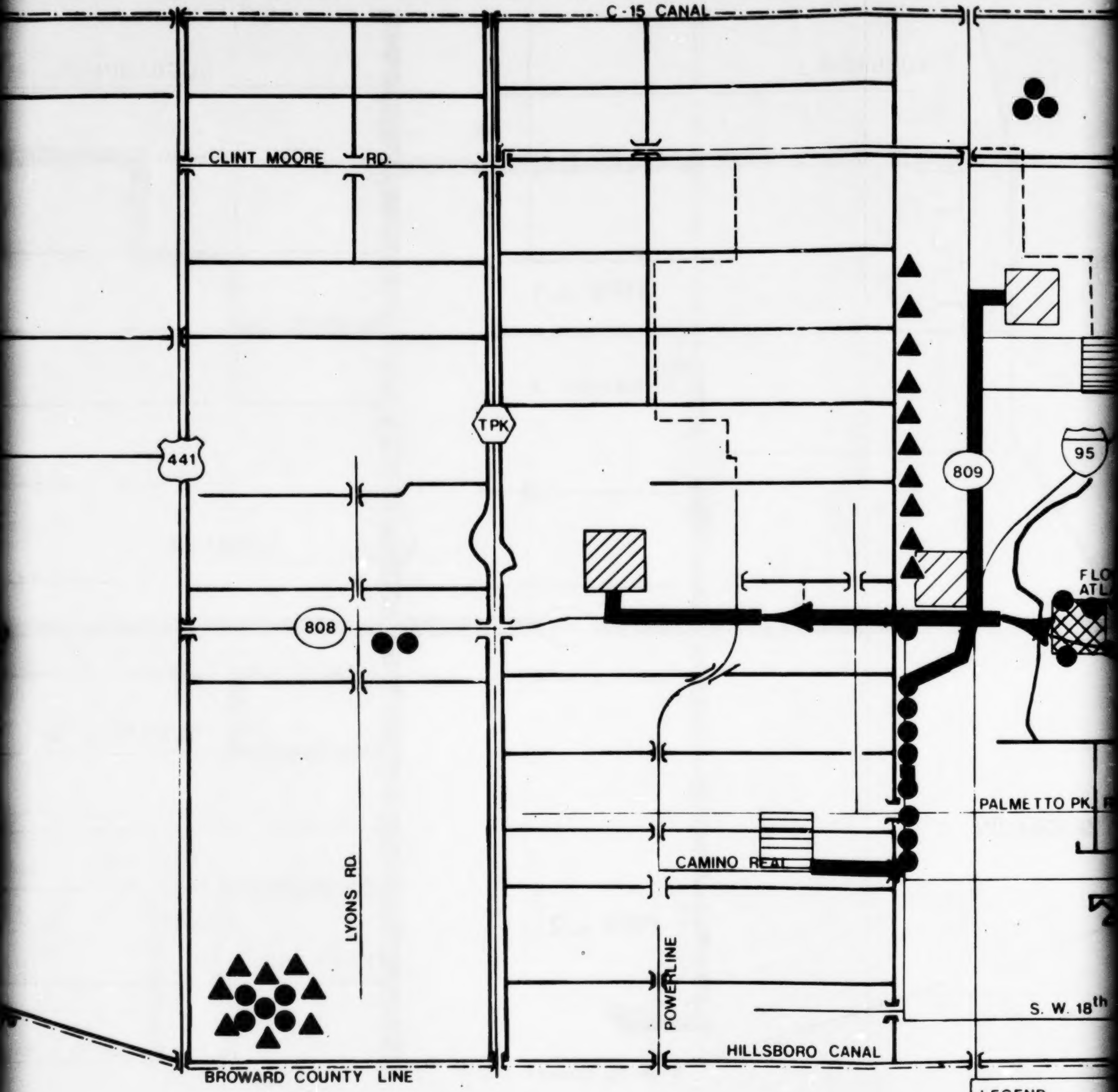
LAND APPLICATION SITES - ALTERNATIVE 2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ALTERNATIVE 2

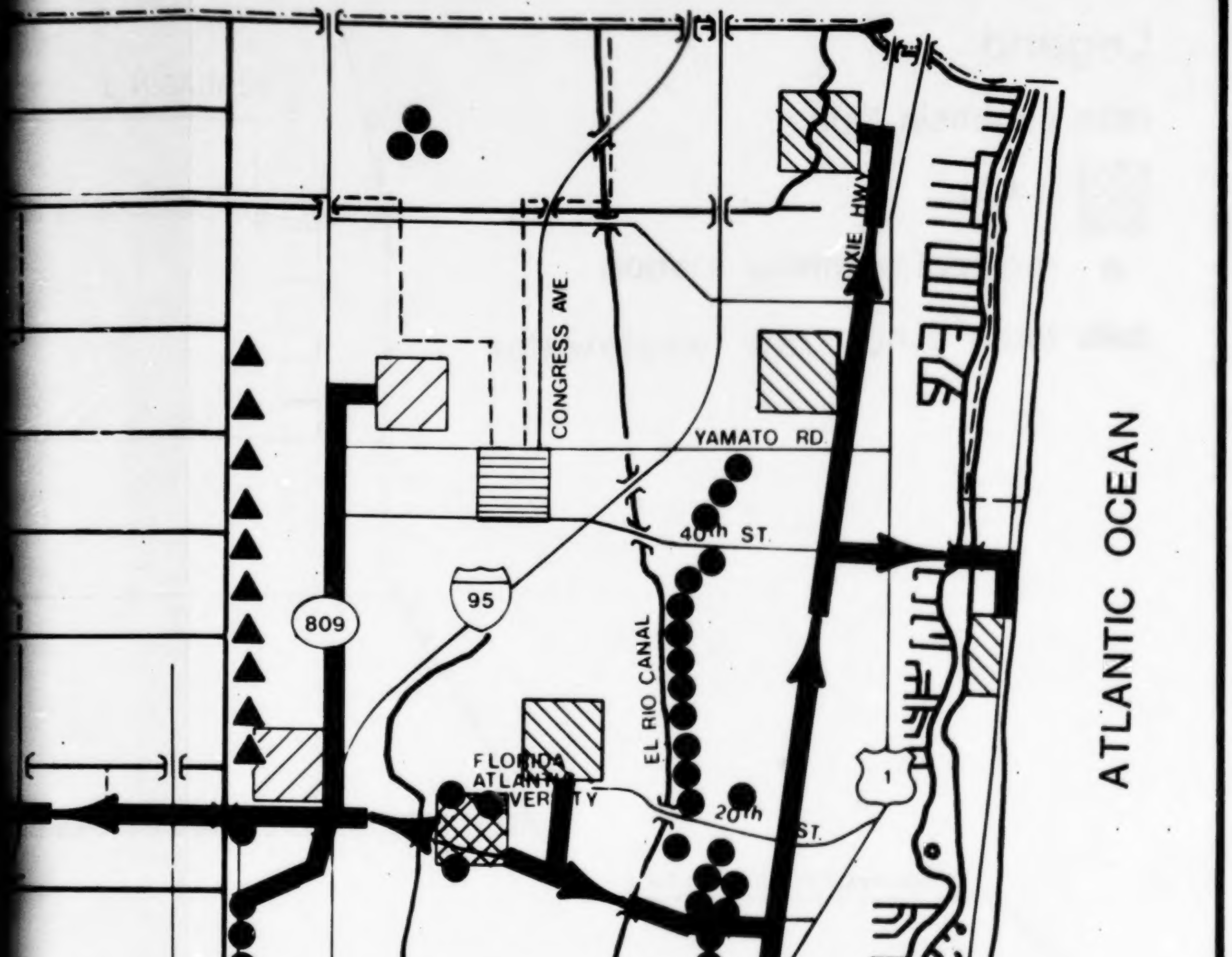
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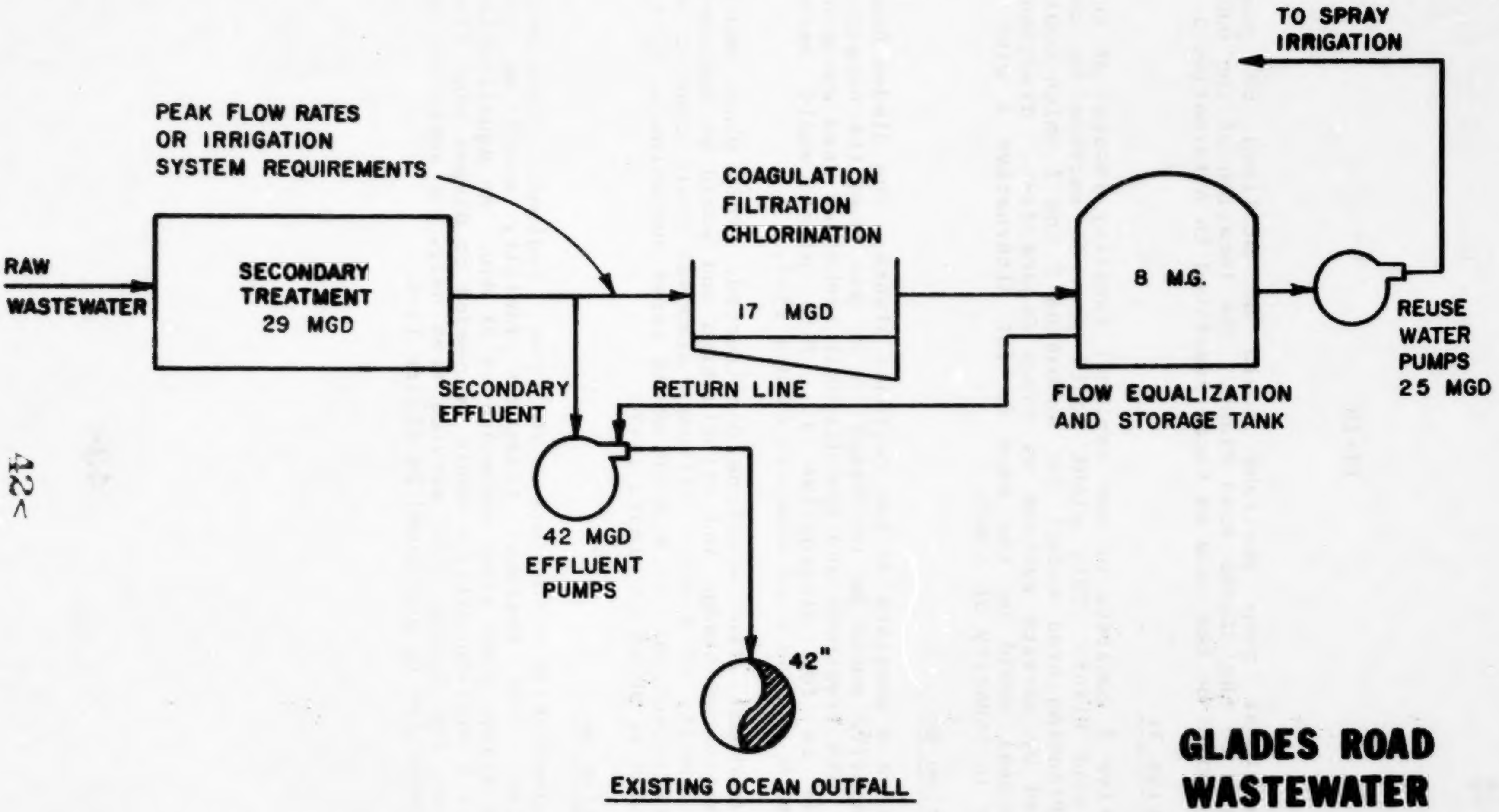
fig II-4


TO SPRAY IRRIGATION
PEAK FLOW RATES OR IRRIGATION SYSTEM REQUIREMENTS
COAGULATION FILTRATION CHLORINATION
RAW WASTEWATER
SECONDARY TREATMENT 29 MGD
17 MGD
8 M.G.
REUSE WATER PUMPS 25 MGD
SECONDARY EFFLUENT
RETURN LINE
FLOW EQUALIZATION AND STORAGE TANK
42 MGD EFFLUENT PUMPS
42"
EXISTING OCEAN OUTFALL

SCHEMATIC FOR ALTERNATIVE 2

**GLADES ROAD
WASTEWATER
TREATMENT
PLANT**

FIGURE II - 5

Three regional pump stations would be utilized to pump wastewater to the Glades Road Plant. The location of the pump stations would be the same as those described in Alternative 1.

Alternative 3:

Alternative 3 consists of one regional facility located at the Glades Road Plant. This plant would provide service to the entire Planning Area except for subbasins F and I which would be served by on-site systems as shown Figure II-6. Treatment and disposal would be the same as for Alternative 1 with a decrease in capacity of 2 MGD.

Alternative 4:

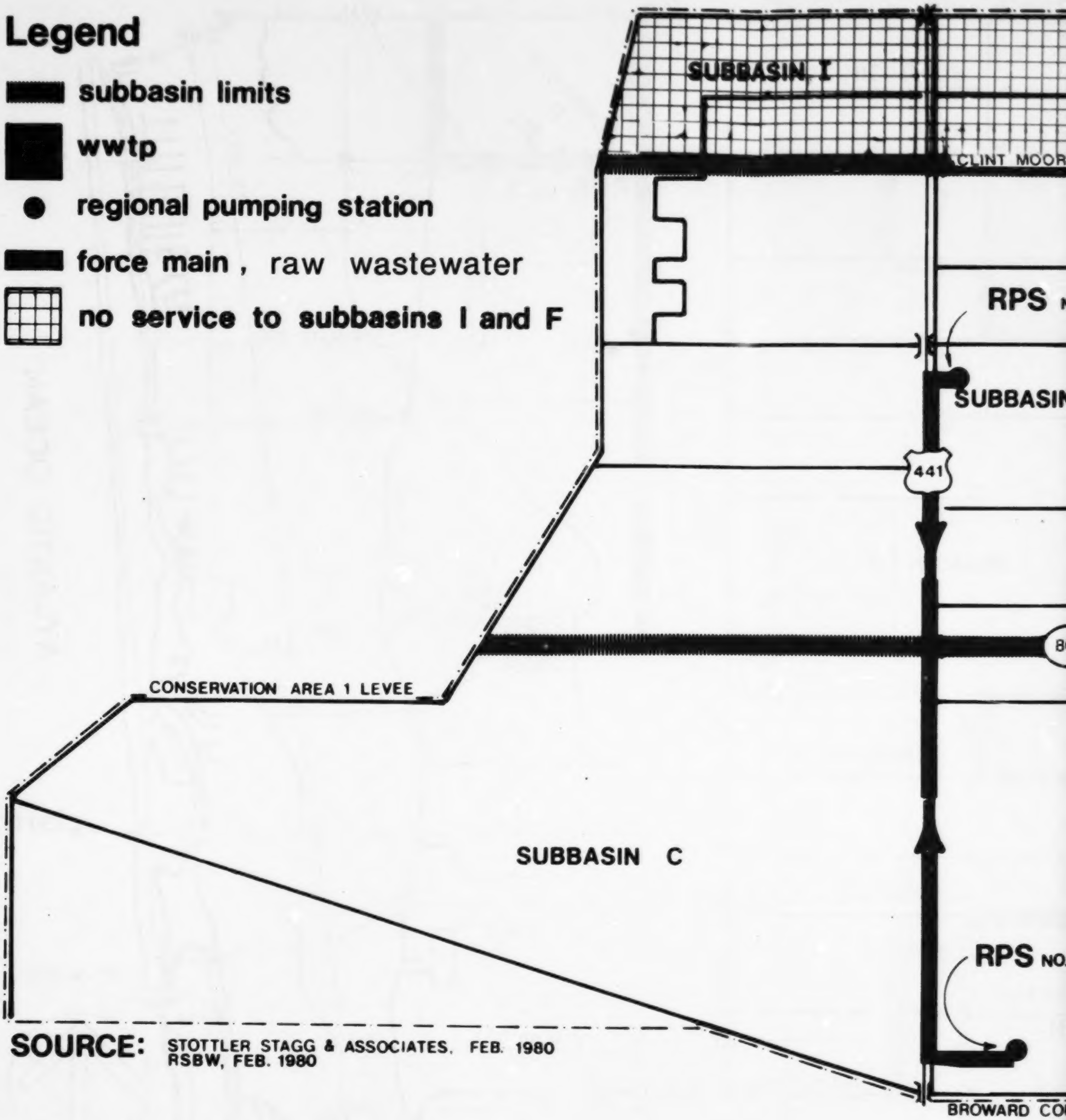
Alternative 4 consists of two regional plants. The Glades Road Plant capacity would be increased to 21 MGD from its existing 10 MGD. The treatment and the disposal technique used would be the same as for Alternative 1. This plant would serve subbasins A, B, and F as shown in Figure II-7.

A West Regional Plant would be constructed. This plant would employ activated sludge and chlorination and would be designed with a capacity of 9 MGD. Effluent disposal would consist of deep well injection. This plant would serve subbasins C, D, E, I, G, and H as shown in Figure II-7.

Alternative 5:

This alternative consists of two regional treatment facilities. One regional treatment facility would be the existing Glades Road Plant expanded to 21 MGD. An equalization volume of 6 million gallons would be needed to dampen peak flow rates from the Glades Road service area only. A schematic of this alternative is presented in Figure II-8.

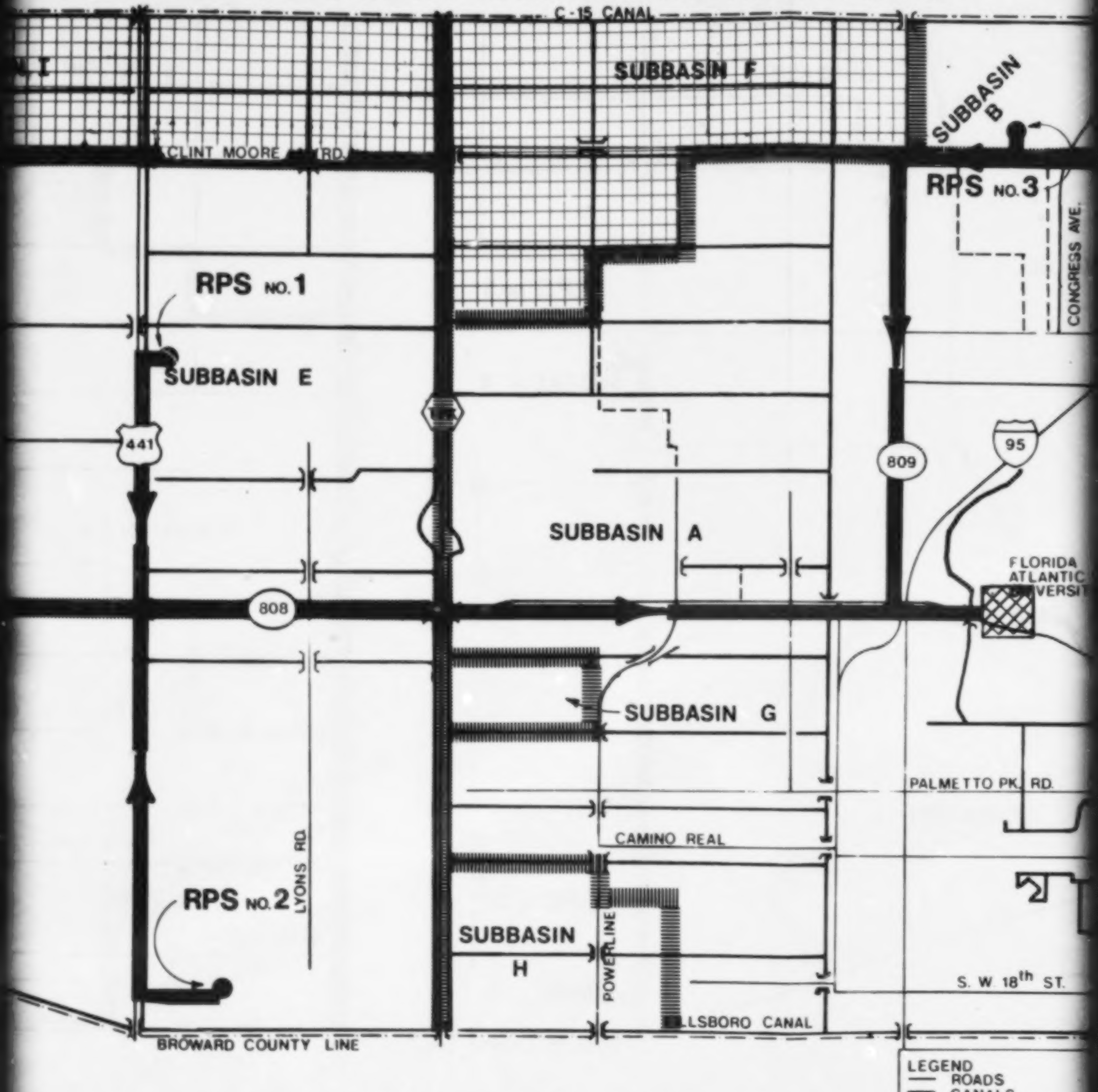
WASTEWATER T


Legend
subbasin limits
wwtp
regional pumping station
force main , raw wastewater
no service to subbasins I and F
SUBBASIN I
CLINT MOOR
RPS
SUBBASIN
441
CONSERVATION AREA 1 LEVEE
SUBBASIN C
RPS NO.
BROWARD CO

SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

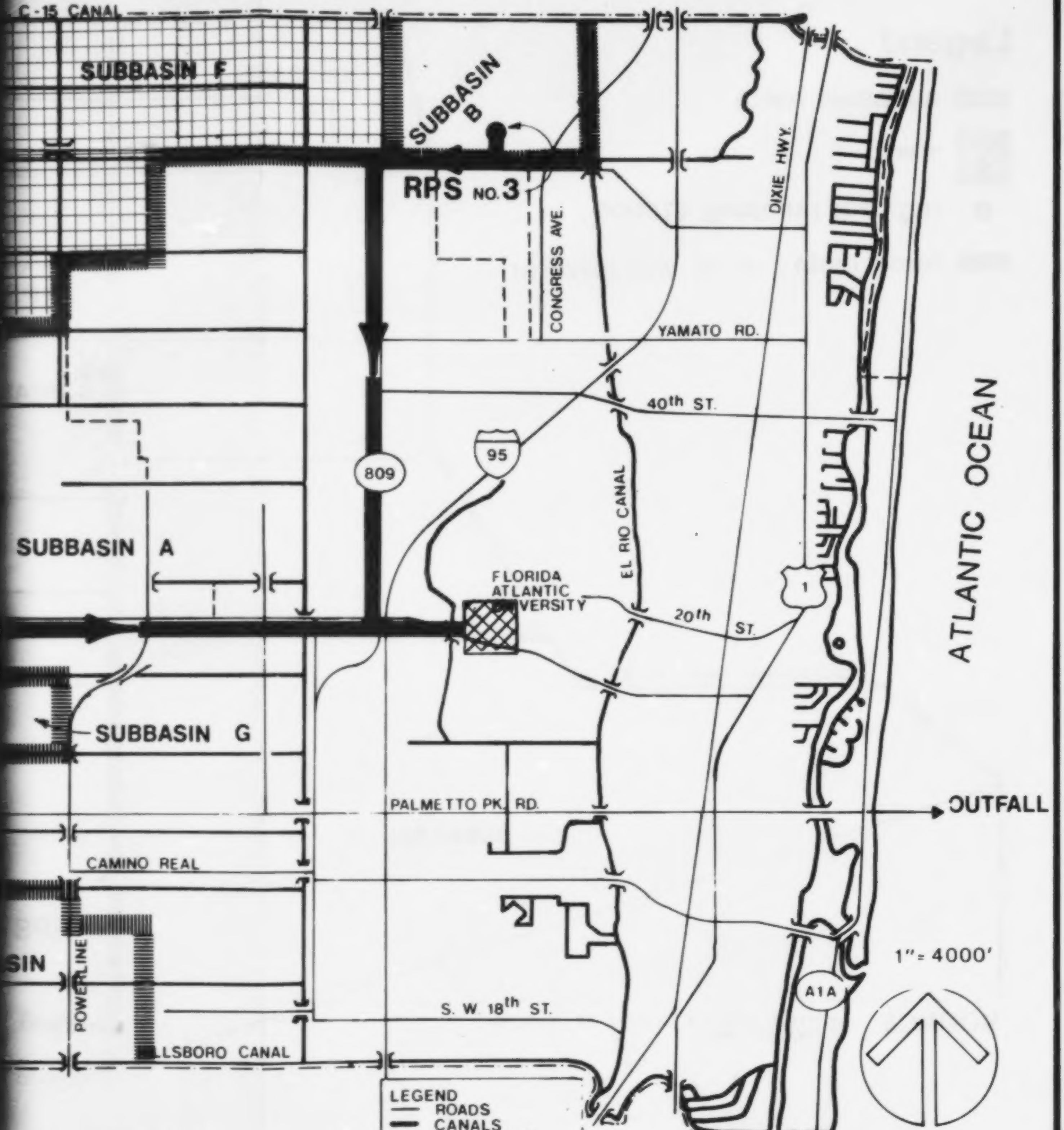
SOUTHERN REGION PALM BEA

ASTEWATER TREATMENT SYSTEM-ALTERNATIVE 3


C-15 CANAL
SUBBASIN F
SUBBASIN B
CLINT MOORE RD.
RPS NO. 3
CONGRESS AVE.
RPS NO. 1
SUBBASIN E
441
809
95
SUBBASIN A
FLORIDA ATLANTIC UNIVERSIT
808
SUBBASIN G
PALMETTO PK. RD.
CAMINO REAL
LYONS RD.
RPS NO. 2
SUBBASIN H
POWERLINE
S. W. 18th ST.
ILLSBORO CANAL
BROWARD COUNTY LINE
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BND

ON PALM BEACH COUNTY 201 AREA EIS

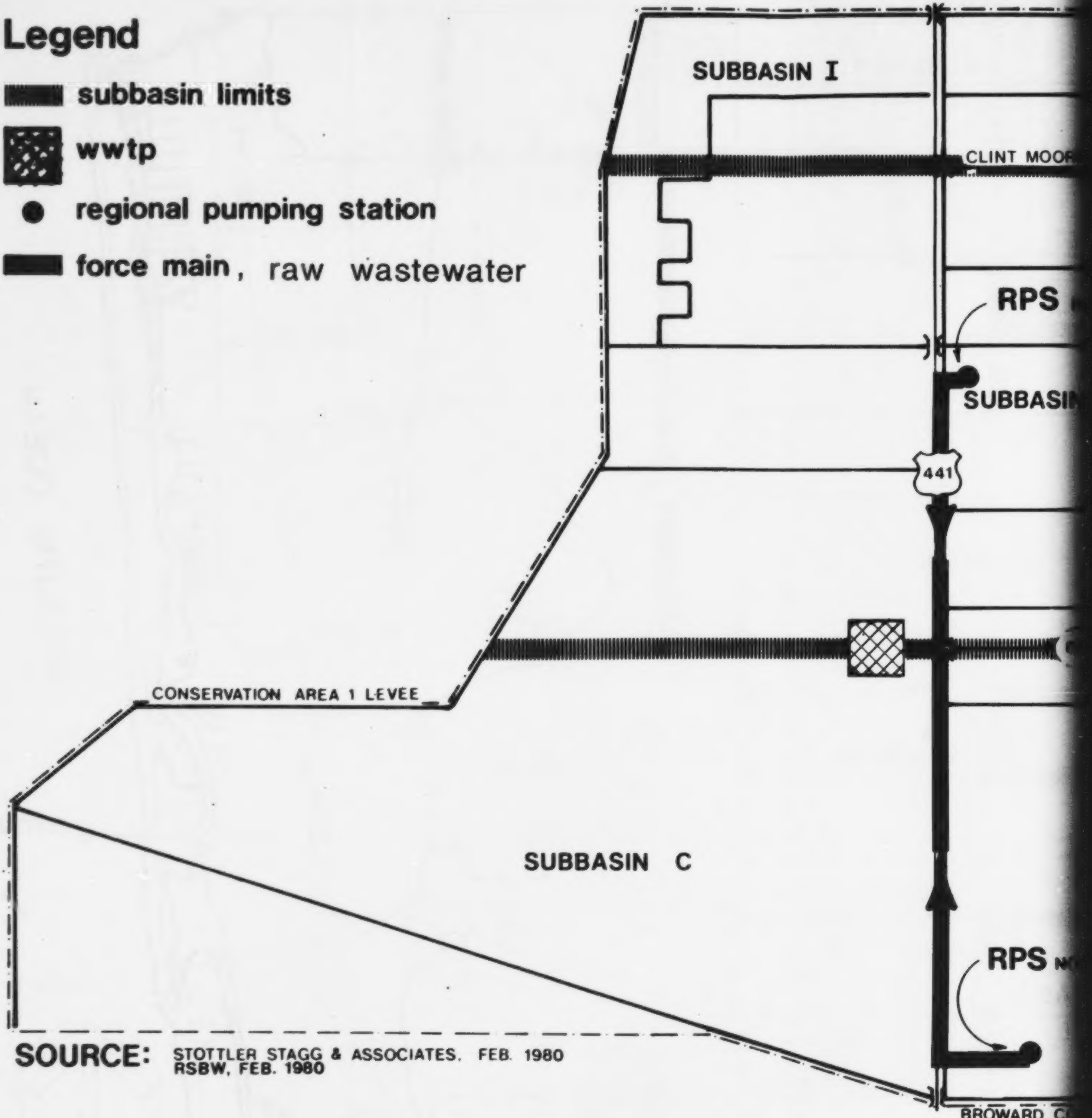
STEM - ALTERNATIVE 3


C-15 CANAL
SUBBASIN F
SUBBASIN B
RPS NO. 3
CONGRESS AVE.
DIXIE HWY.
YAMATO RD.
40th ST.
95
809
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
ATLANTIC OCEAN
SUBBASIN A
SUBBASIN G
PALMETTO PK. RD.
OUTFALL
CAMINO REAL
SIN
POWERLINE
S. W. 18th ST.
A1A
1"= 4000'
LLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

201 AREA EIS

fig II-6

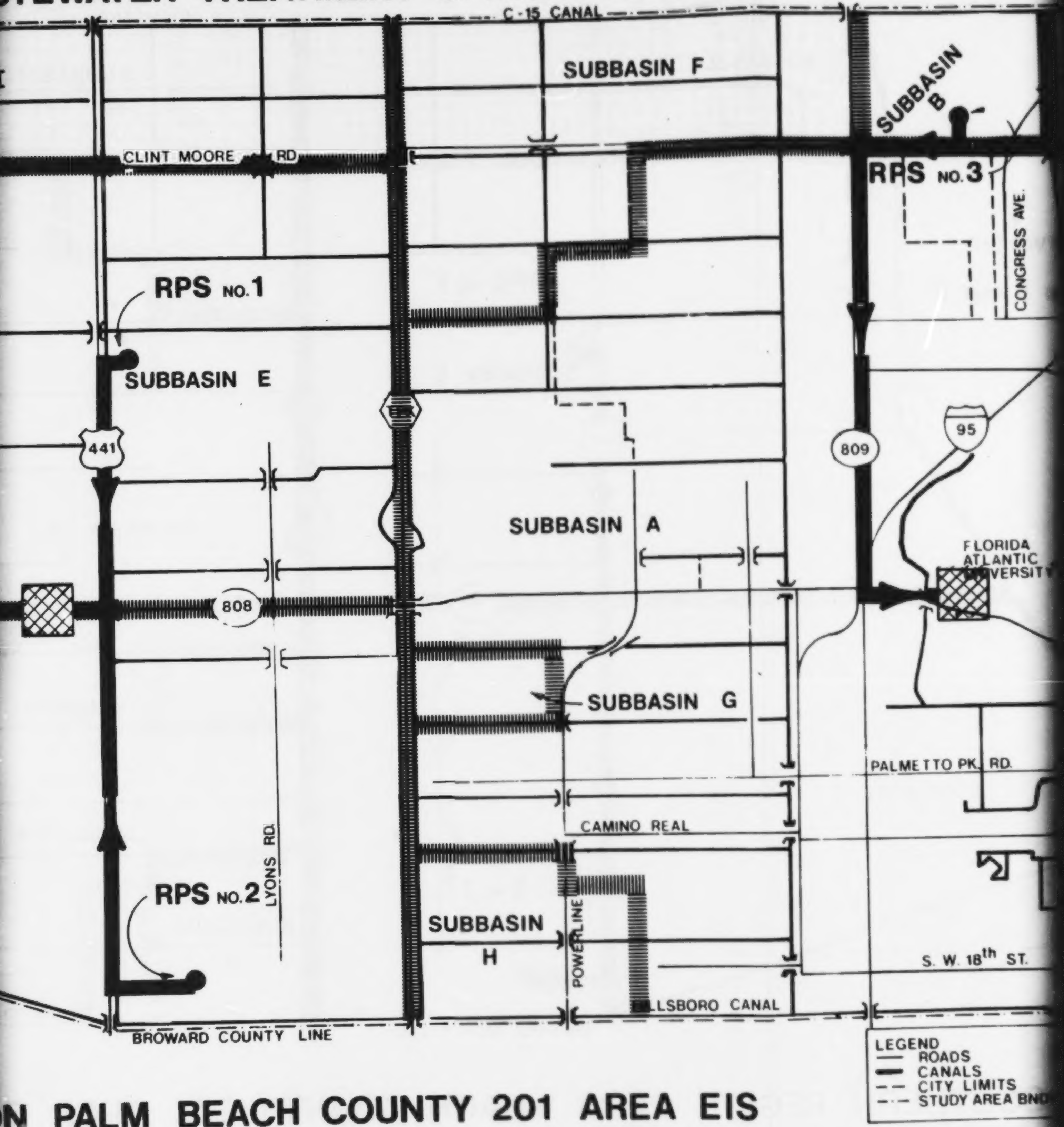
WASTEWATER T


Legend
subbasin limits
wwtp
● regional pumping station
force main, raw wastewater
SUBBASIN I
CLINT MOOR
RPS
SUBBASIN
441
CONSERVATION AREA 1 LEVEE
SUBBASIN C
RPS
BROWARD C

SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

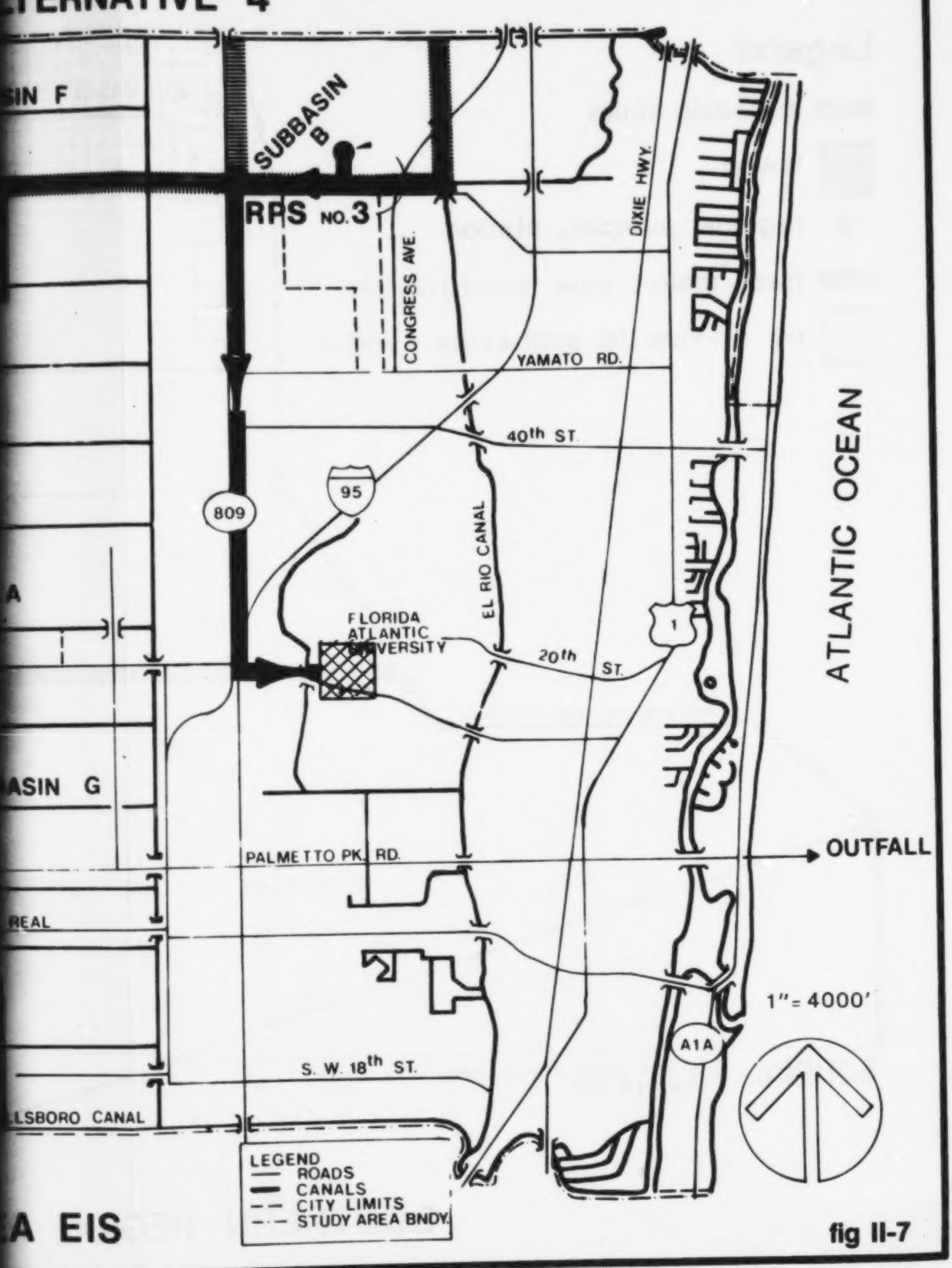
SOUTHERN REGION PALM BEA

STEWATER TREATMENT SYSTEM - ALTERNATIVE 4


C-15 CANAL
SUBBASIN F
SUBBASIN B
CLINT MOORE RD
RPS NO. 3
CONGRESS AVE.
RPS NO. 1
SUBBASIN E
441
95
809
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
808
SUBBASIN G
PALMETTO PK. RD.
CAMINO REAL
RPS NO. 2
LYONS RD.
SUBBASIN H
POWERLINE
S. W. 18th ST.
HILLSBORO CANAL
BROWARD COUNTY LINE
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BND

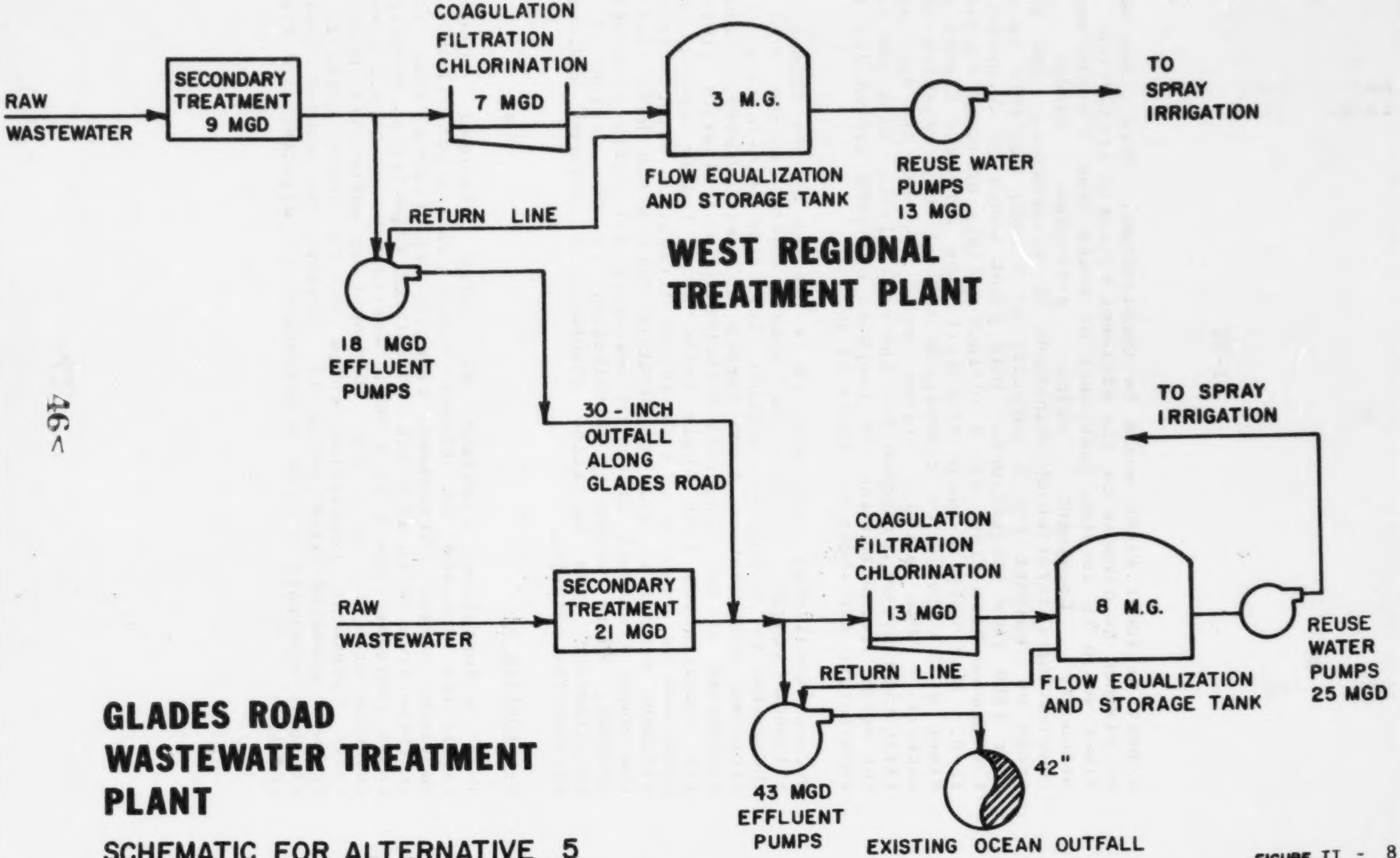
N PALM BEACH COUNTY 201 AREA EIS

LTERNATIVE 4


SIN F
SUBBASIN B
RPS NO. 3
CONGRESS AVE.
DIXIE HWY.
YAMATO RD.
40th ST.
95
809
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
A
ASIN G
PALMETTO PK. RD.
OUTFALL
REAL
S. W. 18th ST.
LLSBORO CANAL
A1A
ATLANTIC OCEAN
1" = 4000'
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

EA EIS

fig II-7


RAW
WASTEWATER
SECONDARY TREATMENT 9 MGD
COAGULATION
FILTRATION
CHLORINATION
7 MGD
3 M.G.
FLOW EQUALIZATION AND STORAGE TANK
REUSE WATER PUMPS 13 MGD
TO SPRAY IRRIGATION
RETURN LINE
WEST REGIONAL TREATMENT PLANT
18 MGD EFFLUENT PUMPS
30 - INCH OUTFALL ALONG GLADES ROAD
RAW
WASTEWATER
SECONDARY TREATMENT 21 MGD
COAGULATION
FILTRATION
CHLORINATION
13 MGD
RETURN LINE
8 M.G.
FLOW EQUALIZATION AND STORAGE TANK
REUSE WATER PUMPS 25 MGD
TO SPRAY IRRIGATION
43 MGD EFFLUENT PUMPS
42"
EXISTING OCEAN OUTFALL

GLADES ROAD
WASTEWATER TREATMENT
PLANT

SCHEMATIC FOR ALTERNATIVE 5

FIGURE II - 8

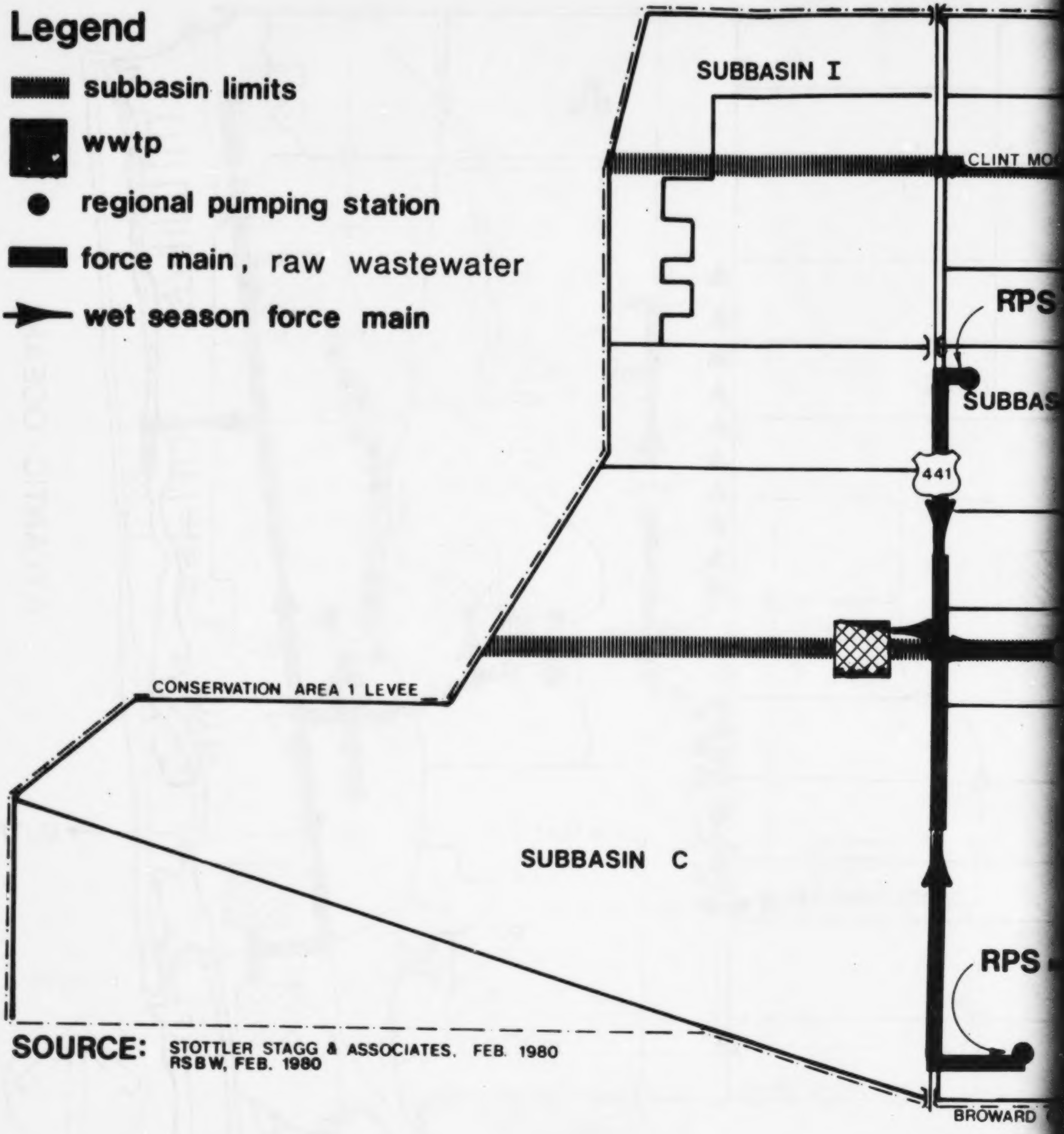
A West Regional Plant would be constructed. This plant would be planned to dispose of its effluent by spray irrigation. The Plant would be located just west of State Road 7 would employ secondary treatment using activated sludge and coagulation-filtration-chlorination of wastewater. The plant would be designed for a capacity of 9 MGD; suitable to meet year 2000 flow projections. This plant would be connected to the Glades Road Plant via a 30-inch outfall as shown on Figure II-9. This outfall would transport flow into the Glades Road Plant so it could be discharged through the existing ocean outfall. This outfall serves as a backup to the spray irrigation system proposed for the West Plant. Selected sites for spray irrigation and the proposed delivery system for this alternative are shown on Figure II-10.

Because additional flows need to be handled by the Glades Road effluent pumping system the equalization storage must be increased to 8 million gallons for this alternative. The proposed equalization tank serves a dual purpose. Located downstream of the coagulation-filtration-chlorination process, the equalization tank would serve as a buffer against peak flows and as a source of storage for irrigation water. Treated effluent stored in the equalization tank would have received the added treatment making it suitable for spray irrigation. However, there would be flexibility in the design of the equalization tank to allow discharge of stored wastewater through the outfall.

Alternative 6:

This alternative consists of three regional treatment facilities located at Glades Road, Sandalfoot Cove, and American Homes. Treatment capacity at Glades Road would increase from 10 to 17.5 MGD. Treatment capacity at Sandalfoot would increase from 3 to 6 MGD. American Homes capacity would increase from 1.5 to 6 MGD. Disposal of wastewater from all three treatment facilities would be by ocean outfall. A 30-inch diameter line would be required to convey treated effluent eastward. This alternative is depicted in Figure II-11.

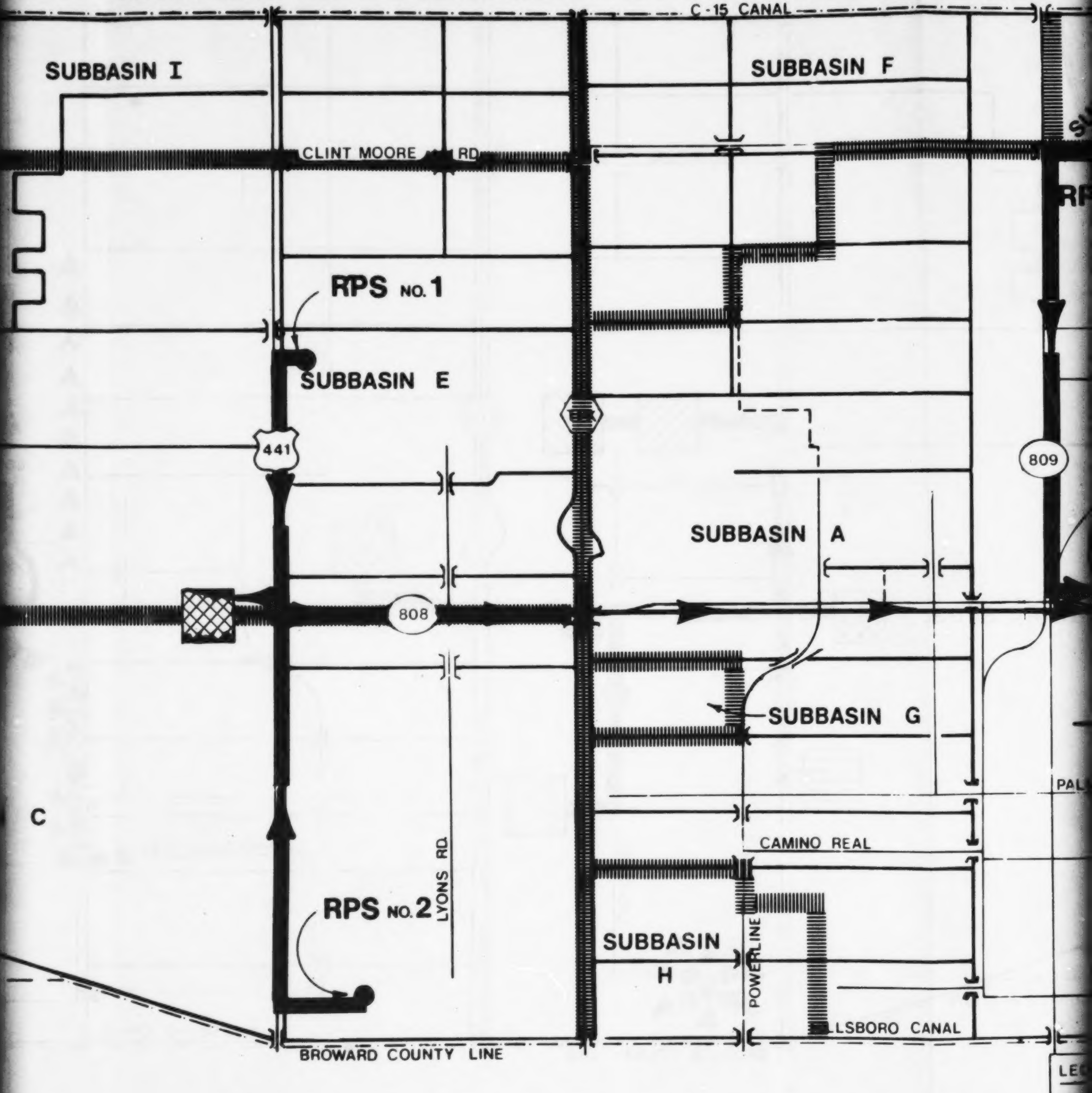
WASTEWATER


Legend
subbasin limits
wwtp
regional pumping station
force main, raw wastewater
wet season force main
SUBBASIN I
CLINT MO
RPS
SUBBAS
441
CONSERVATION AREA 1 LEVEE
SUBBASIN C
RPS
BROWARD

SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

SOUTHERN REGION PALM BE

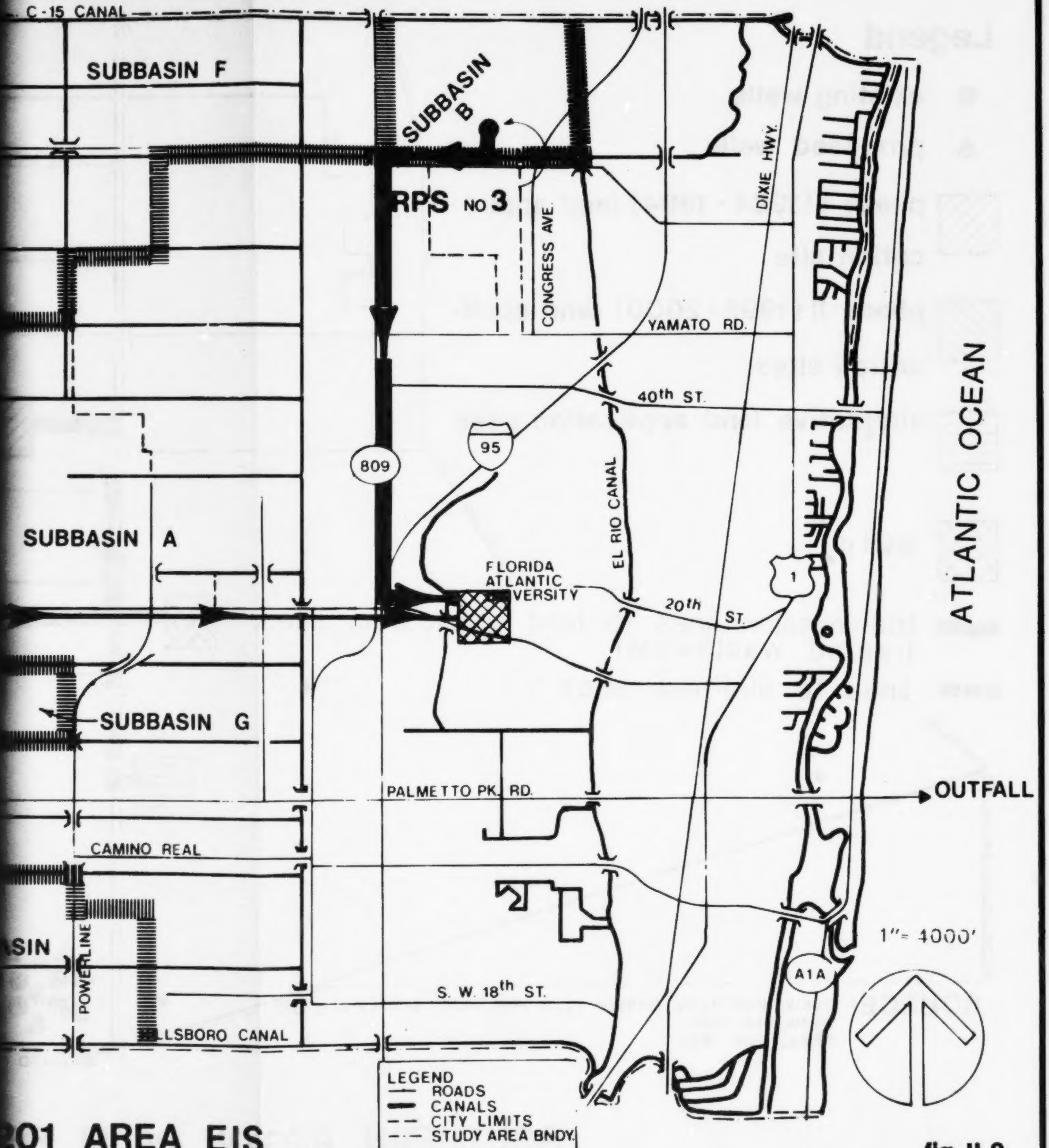
WASTEWATER TREATMENT SYSTEM-ALTERNATIVE 5



C-15 CANAL
SUBBASIN I
SUBBASIN F
CLINT MOORE RD
RPS NO. 1
SUBBASIN E
441
809
SUBBASIN A
808
SUBBASIN G
C
PAL
CAMINO REAL
LYONS RD.
RPS NO. 2
SUBBASIN H
POWERLINE
LLSBORO CANAL
BROWARD COUNTY LINE
LEG

N REGION PALM BEACH COUNTY 201 AREA EIS

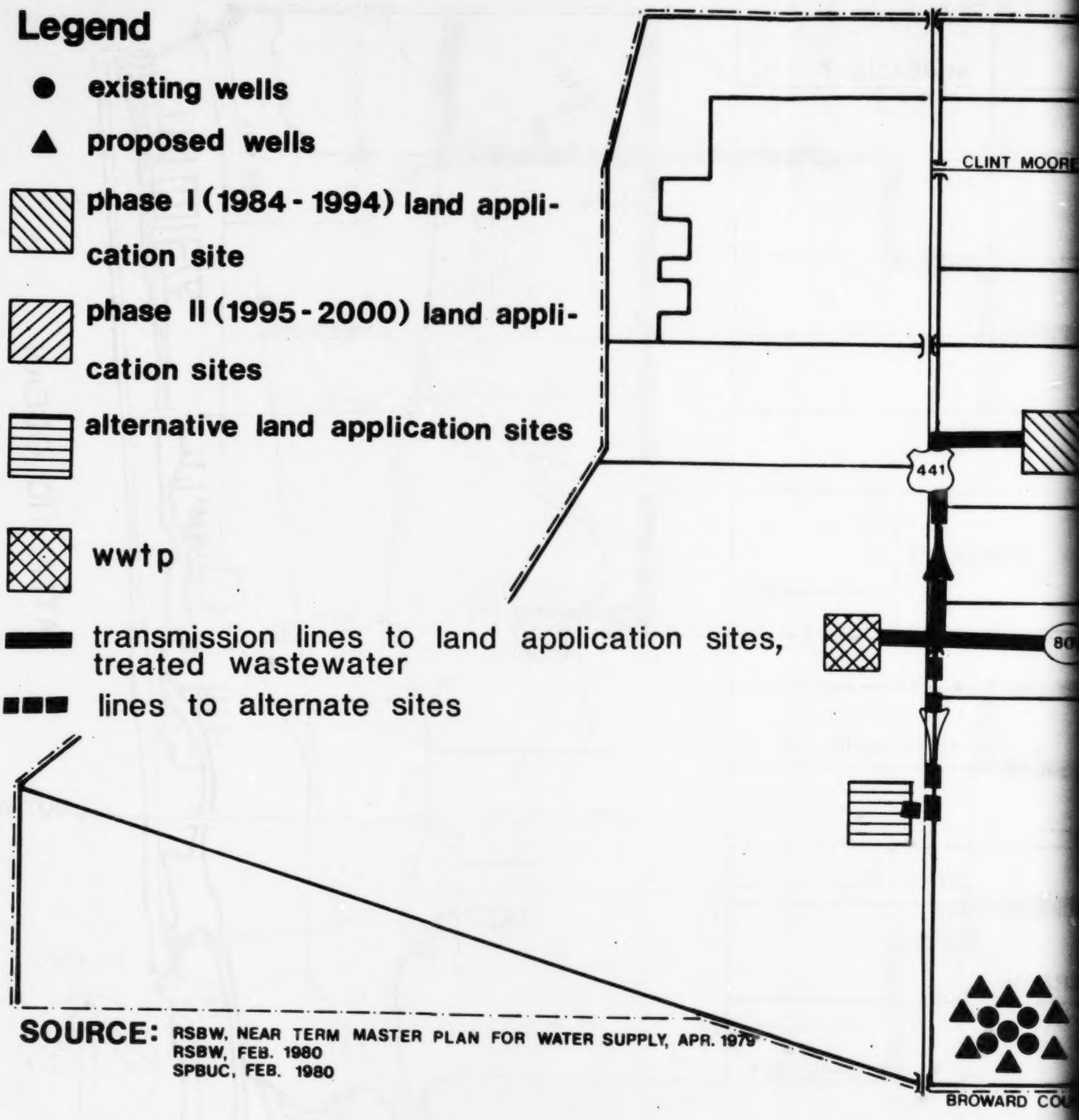
STEM-ALTERNATIVE 5


C-15 CANAL
SUBBASIN F
SUBBASIN B
RPS NO 3
CONGRESS AVE.
DIXIE HWY.
YAMATO RD.
40th ST.
95
809
EL RIO CANAL
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
ATLANTIC OCEAN
SUBBASIN G
PALMETTO PK. RD.
OUTFALL
CAMINO REAL
ASIN
POWERLINE
1"= 4000'
A1A
S. W. 18th ST.
LLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

201 AREA EIS

fig II-9

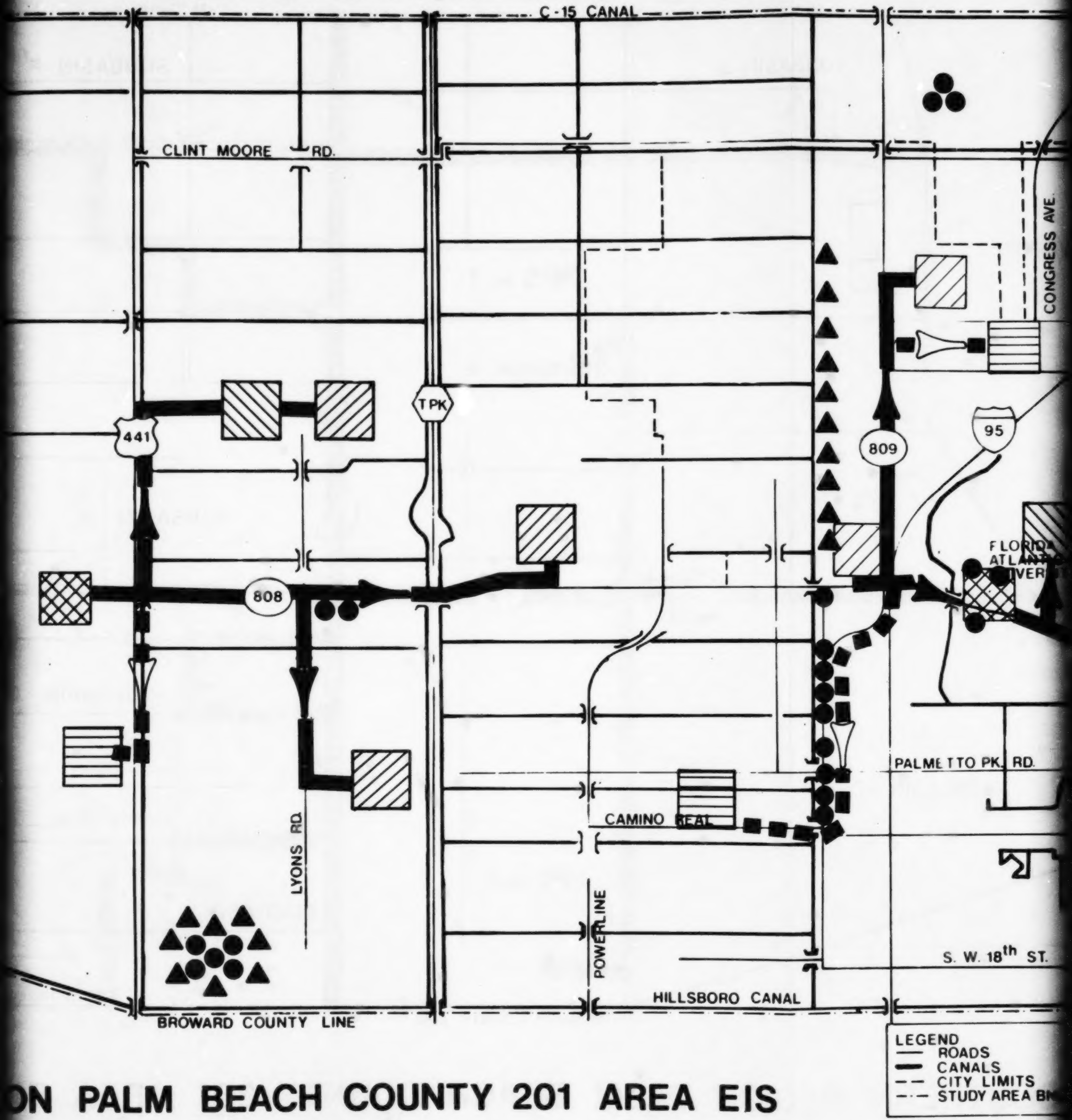
LAND


Legend
● existing wells
▲ proposed wells
▧ phase I (1984 - 1994) land application site
▨ phase II (1995 - 2000) land application sites
▤ alternative land application sites
▩ wwtp
▬ transmission lines to land application sites, treated wastewater
■■■ lines to alternate sites
CLINT MOORE
441
80
BROWARD CO

SOURCE: RSBW, NEAR TERM MASTER PLAN FOR WATER SUPPLY, APR. 1979
RSBW, FEB. 1980
SPBUC, FEB. 1980

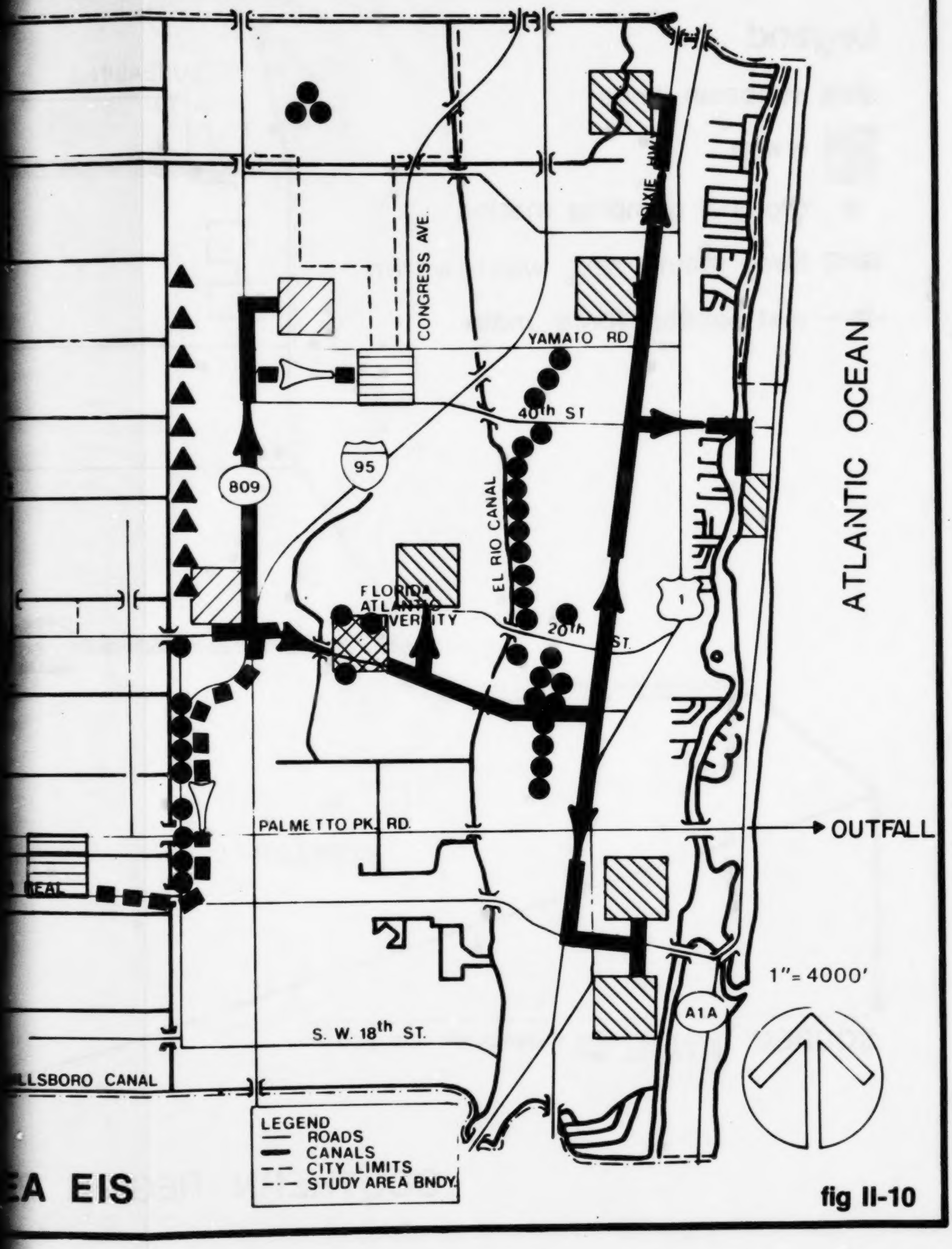
SOUTHERN REGION PALM BEA

LAND APPLICATION SITES - ALTERNATIVE 5


C-15 CANAL
CLINT MOORE RD.
CONGRESS AVE.
TPK
441
808
809
95
FLORIDA
ATLANT
UNIVER
LYONS RD.
POWERLINE
CAMINO REAL
PALMETTO PK. RD.
S. W. 18th ST.
HILLSBORO CANAL
BROWARD COUNTY LINE
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BN

ON PALM BEACH COUNTY 201 AREA EIS

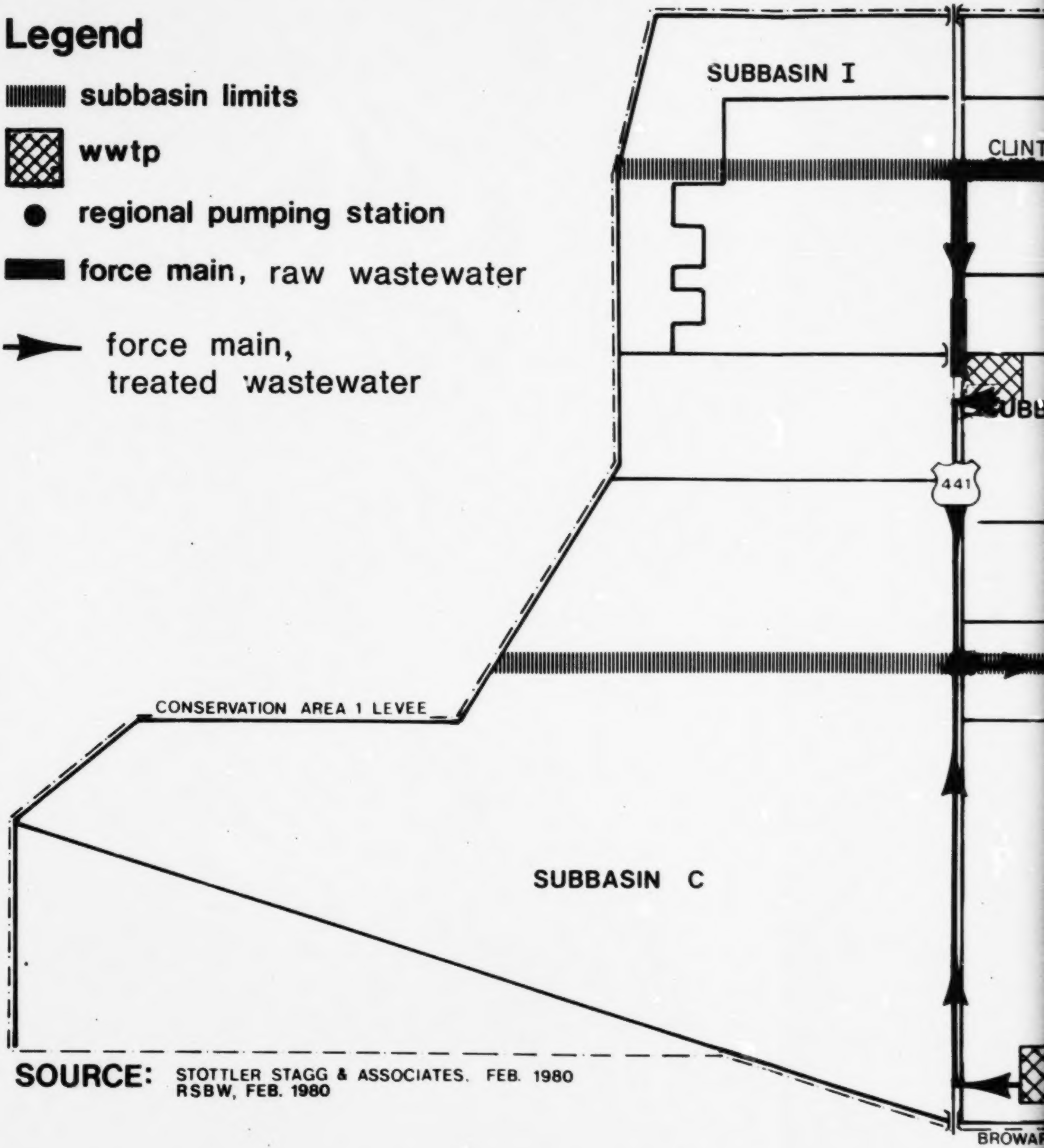
ALTERNATIVE 5


CONGRESS AVE.
DIXIE HWY
YAMATO RD
40th ST
95
809
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
ATLANTIC OCEAN
PALMETTO PK. RD.
OUTFALL
REAL
S. W. 18th ST.
LLSBORO CANAL
A1A
1"= 4000'
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

EA EIS

fig II-10

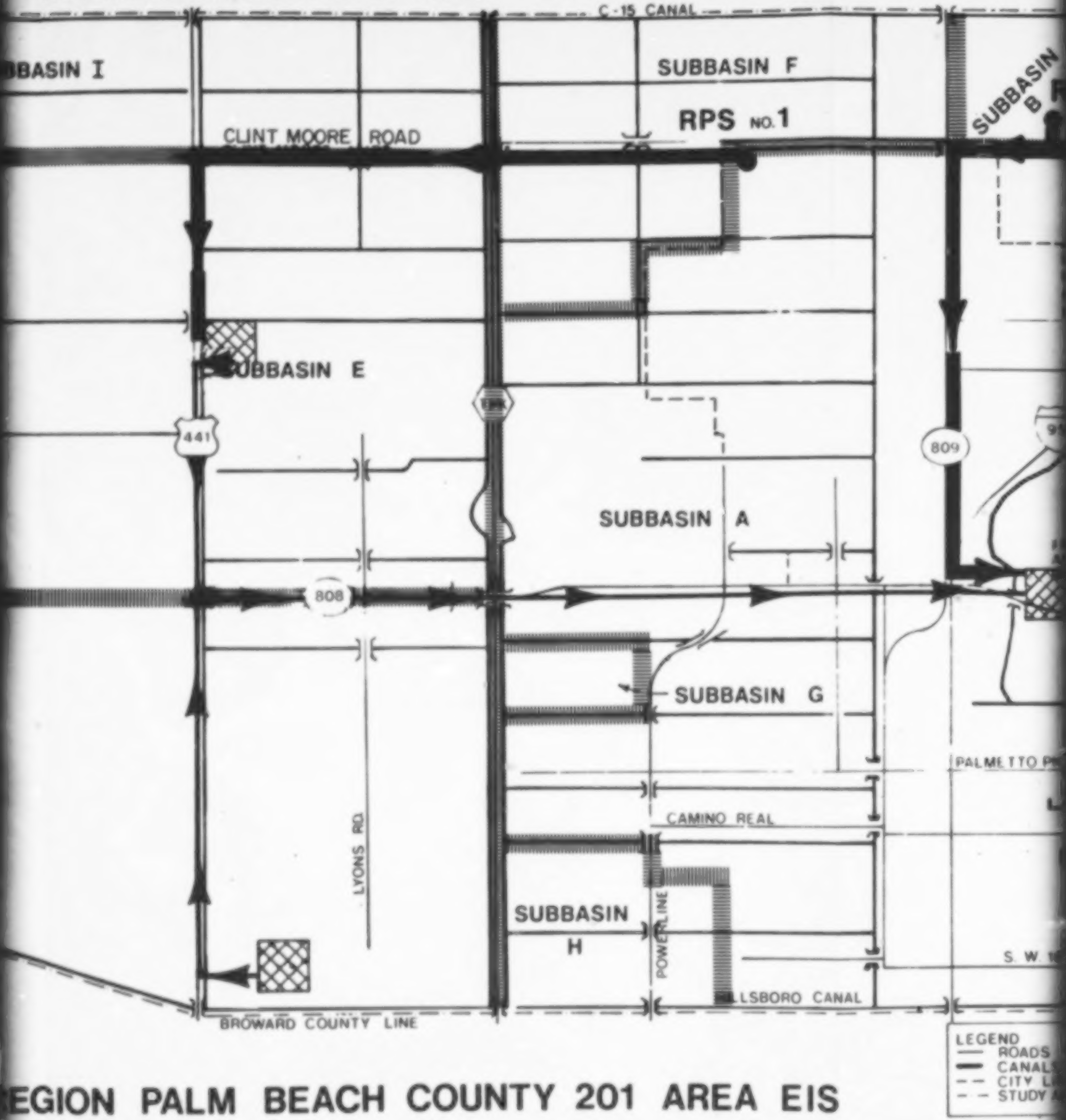
WASTEWATER


Legend
subbasin limits
wwtp
regional pumping station
force main, raw wastewater
force main, treated wastewater
SUBBASIN I
CLINT
441
CONSERVATION AREA 1 LEVEE
SUBBASIN C
BROWAR

SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

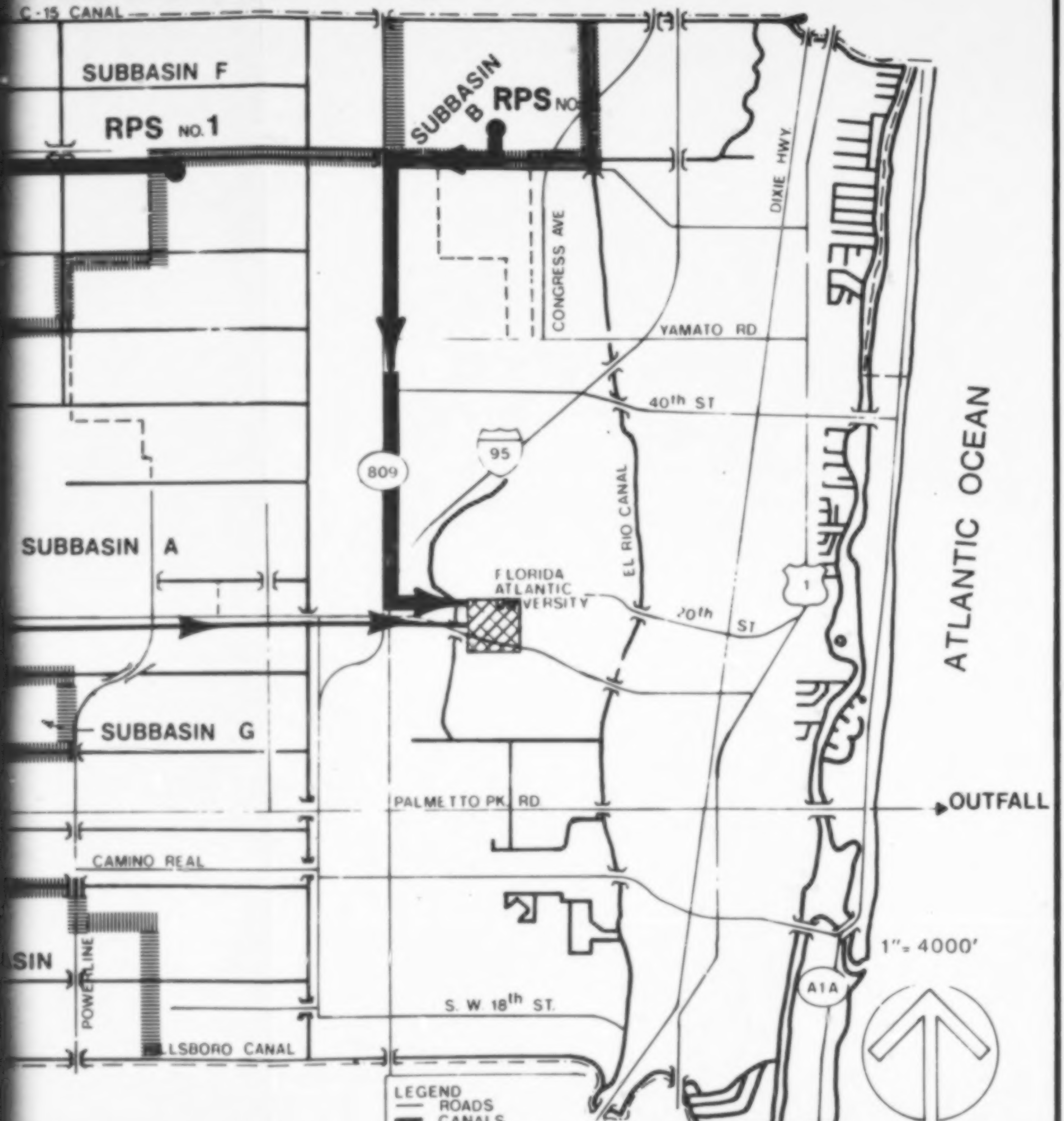
SOUTHERN REGION PALM B

WASTEWATER TREATMENT SYSTEM-ALTERNATIVE 6


C-15 CANAL
BBASIN I
SUBBASIN F
SUBBASIN B
RPS NO. 1
CLINT MOORE ROAD
SUBBASIN E
441
SUBBASIN A
809
808
SUBBASIN G
PALMETTO PA
CAMINO REAL
LYONS RD.
POWERLINE
SUBBASIN H
S. W. 1
LLSBORO CANAL
BROWARD COUNTY LINE
LEGEND
ROADS
CANALS
CITY L
STUDY A

EGION PALM BEACH COUNTY 201 AREA EIS

STEM-ALTERNATIVE 6


C-15 CANAL
SUBBASIN F
RPS NO.1
SUBBASIN B
RPS NO.
CONGRESS AVE
DIXIE HWY
YAMATO RD
40th ST
95
809
EL RIO CANAL
ATLANTIC OCEAN
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
20th ST
1
SUBBASIN G
PALMETTO PK. RD
OUTFALL
CAMINO REAL
SIN
POWERLINE
A1A
1"= 4000'
S. W. 18th ST.
HILLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

201 AREA EIS

fig II-11

Alternative 7:

Alternative 7 consists of one regional plant at Glades Road with the same type of treatment, capacity, discharge, and pumping station configuration as Alternative 1. No centralized service would be provided to the land classified as unique agricultural land in Figure II-12. Densities in the other parts of the County Planning Area were assumed to increase so the total population level would be the same as for the other alternatives.

Alternative 8

This alternative is the no Federal action alternative in which no Federal 201 grant money would be given for construction in the Planning Area. It is estimated that the City and the County would expand the existing facilities in the area with 100% local funding if this alternative is chosen. This would mean expansion of the Glades Road Plant to 17.5 MGD to accommodate the City's service area. The three County plants would probably remain in service until their capacities were reached between 1988 and 1990. These plants could then be expanded to 6 MGD each at Sandalfoot and American Homes and .7 MGD at Pheasant Walk with discharge to percolation ponds or to the City's ocean outfall. A third alternative for the County would be pumping all wastewater to the Glades Road Plant for treatment and disposal. An agreement would have to be reached between the City and County concerning the appropriate option for implementation. This alternative is depicted in Figure II-13.

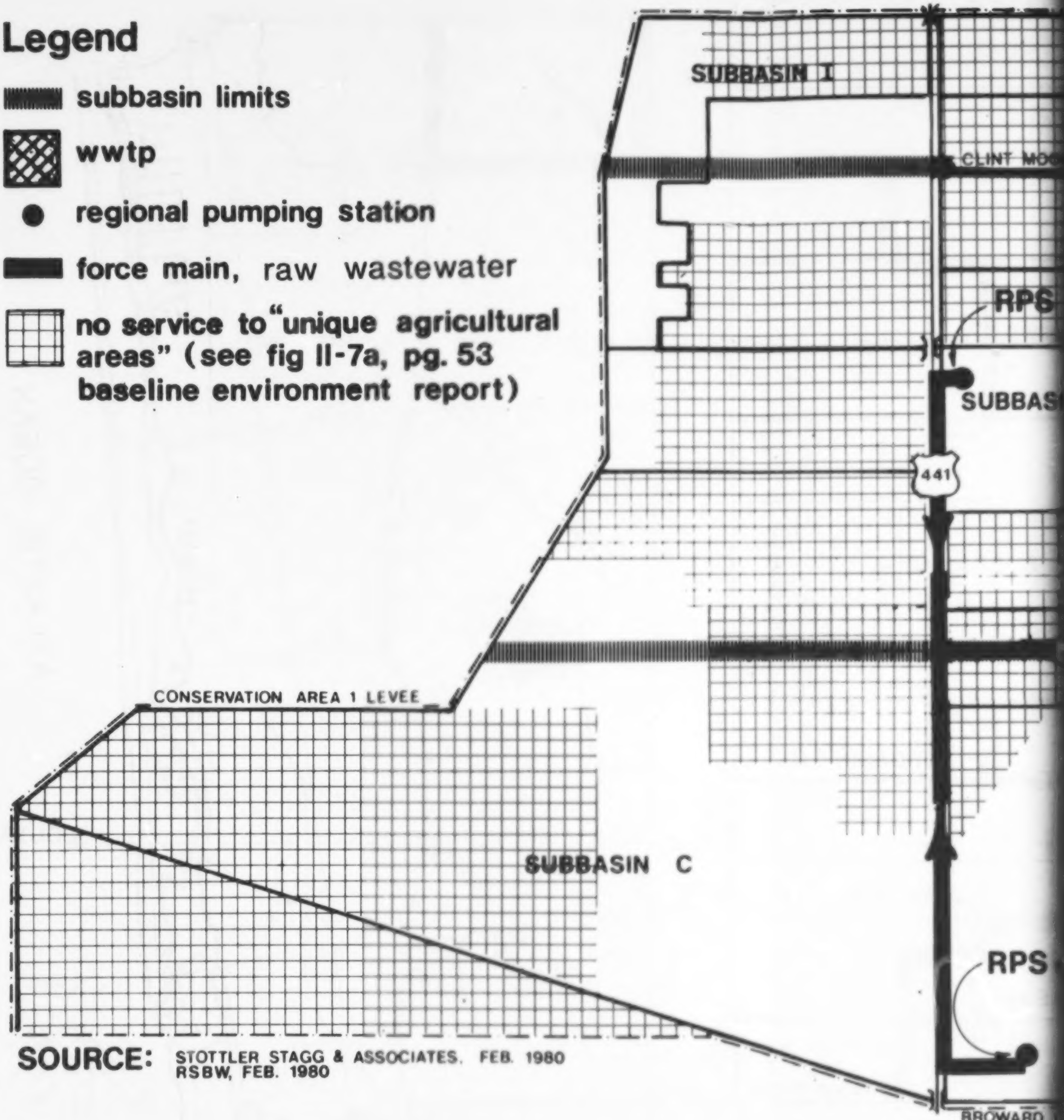
Alternative 9

Alternative 9 is designed to serve as a potential disposal option which could be used in conjunction with any of the other alternatives. This alternative was developed to include a dual water system as used in St. Petersburg, Florida. The configuration for the system is presented in Figure II-14.

Alternative 10

Alternative 10 consists of constructing a system with configuration, treatment level and type of disposal identical to Alternative 1. The pump station, force main to the Glades Road Plant, and the ultimate size of the treatment plant would be downsized so as not to serve that part of the population projected to settle on unique agricultural lands as defined by the SCS. The ultimate capacity of the Glades Road Plant would be 23 MGD.

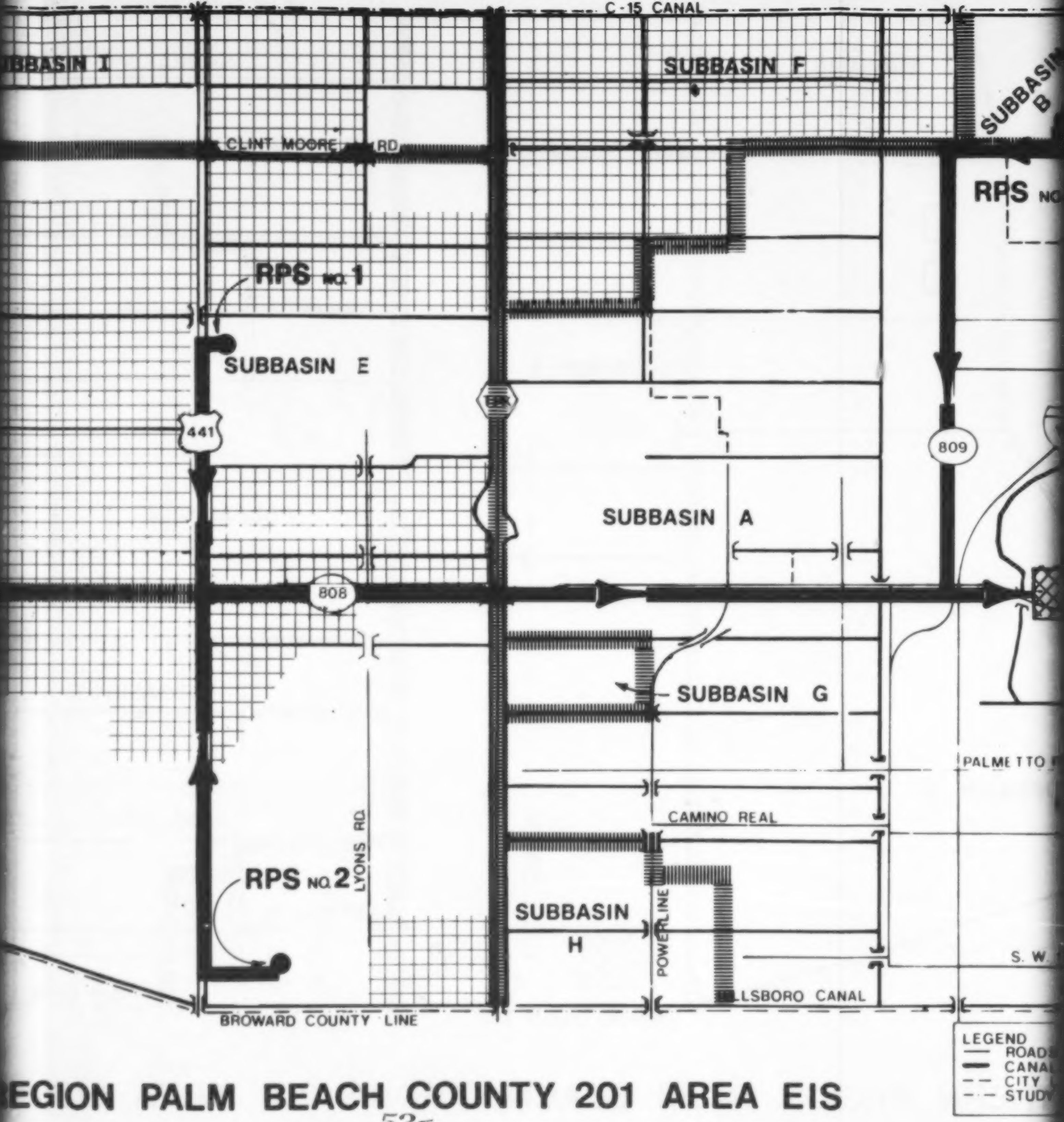
WASTEWATER T


Legend
▨ subbasin limits
▨ wwtp
● regional pumping station
▬ force main, raw wastewater
▦ no service to "unique agricultural areas" (see fig II-7a, pg. 53 baseline environment report)
SUBBASIN I
CLINT MOO
RPS
SUBBAS
441
CONSERVATION AREA 1 LEVEE
SUBBASIN C
RPS
BROWARD

SOURCE: STOTTLER STAGG & ASSOCIATES. FEB. 1980
RSBW, FEB. 1980

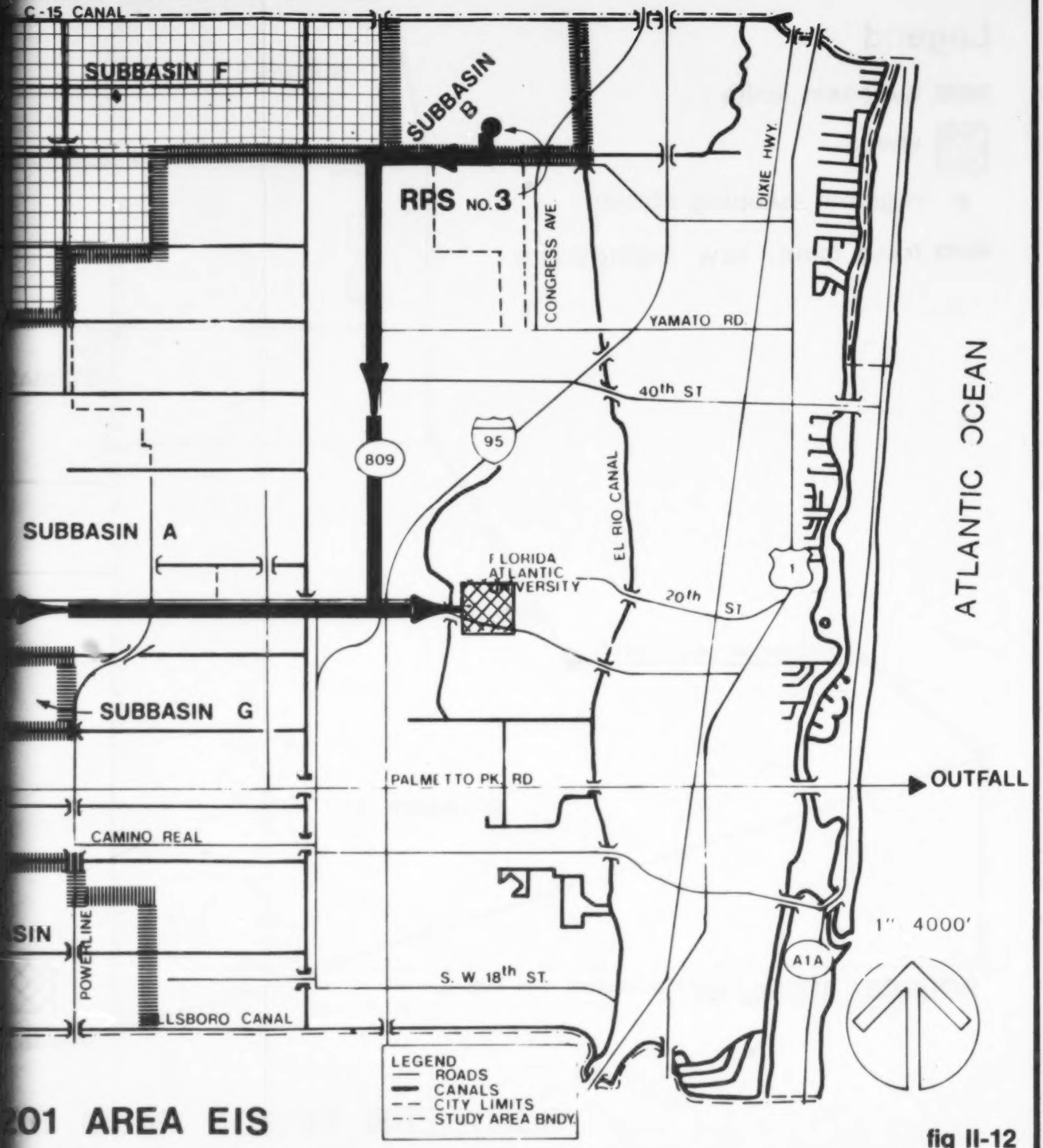
SOUTHERN REGION PALM BE

WASTEWATER TREATMENT SYSTEM - ALTERNATIVE 7


C-15 CANAL
SUBBASIN I
SUBBASIN F
SUBBASIN B
CLINT MOORE RD
RPS NO
RPS NO. 1
SUBBASIN E
441
809
SUBBASIN A
808
SUBBASIN G
PALMETTO
CAMINO REAL
RPS NO. 2
LYONS RD.
SUBBASIN H
POWERLINE
S. W.
HILLSBORO CANAL
BROWARD COUNTY LINE
LEGEND
ROADS
CANAL
CITY
STUDY

EGION PALM BEACH COUNTY 201 AREA EIS

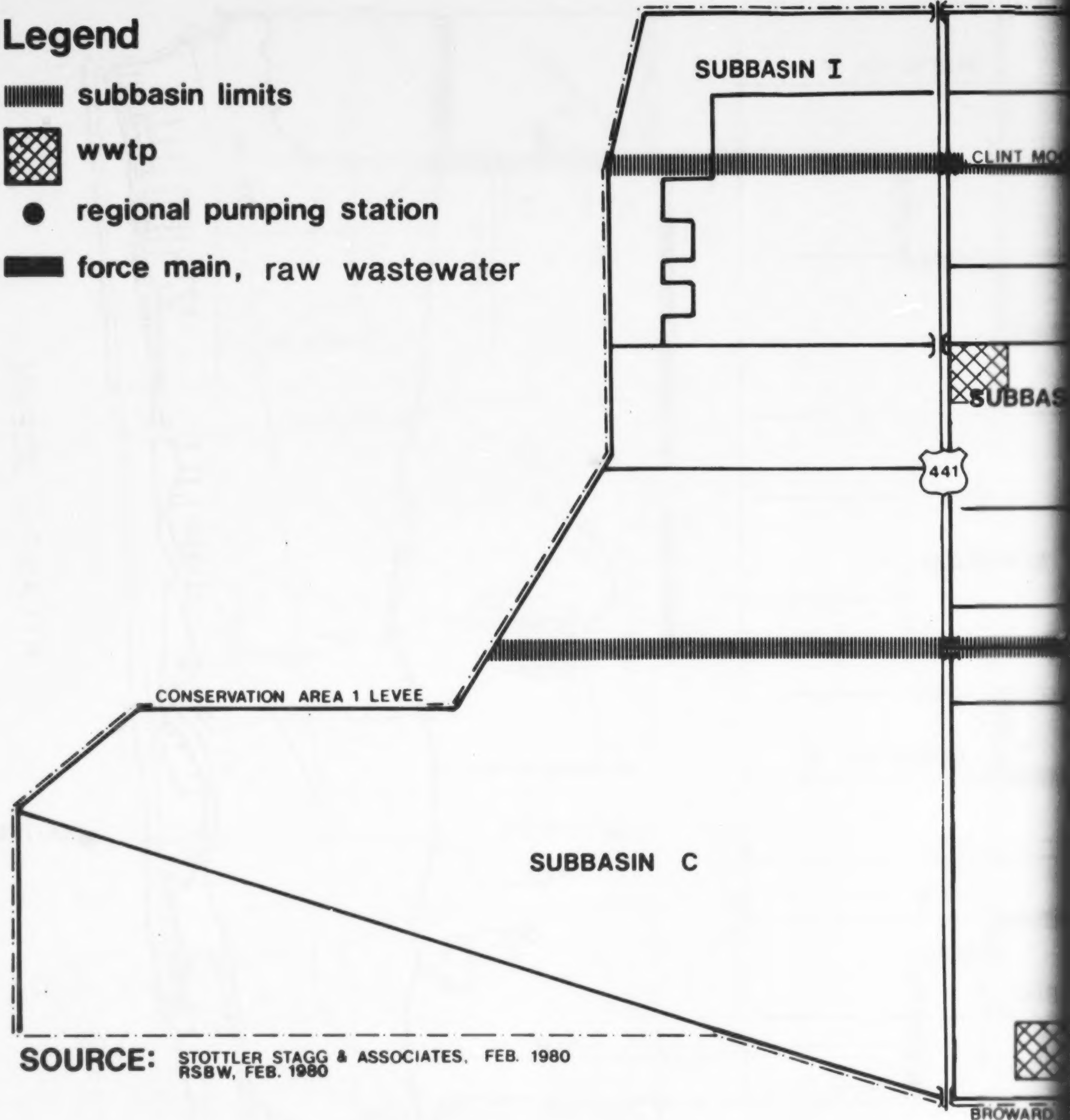
STEM-ALTERNATIVE 7


C-15 CANAL
SUBBASIN F
SUBBASIN B
RPS NO. 3
CONGRESS AVE.
DIXIE HWY.
YAMATO RD.
40th ST
809
95
EL RIO CANAL
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
20th ST
1
ATLANTIC OCEAN
SUBBASIN G
PALMETTO PK. RD
OUTFALL
CAMINO REAL
SIN
POWERLINE
A1A
1" 4000'
S. W. 18th ST.
HILLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

201 AREA EIS

fig II-12

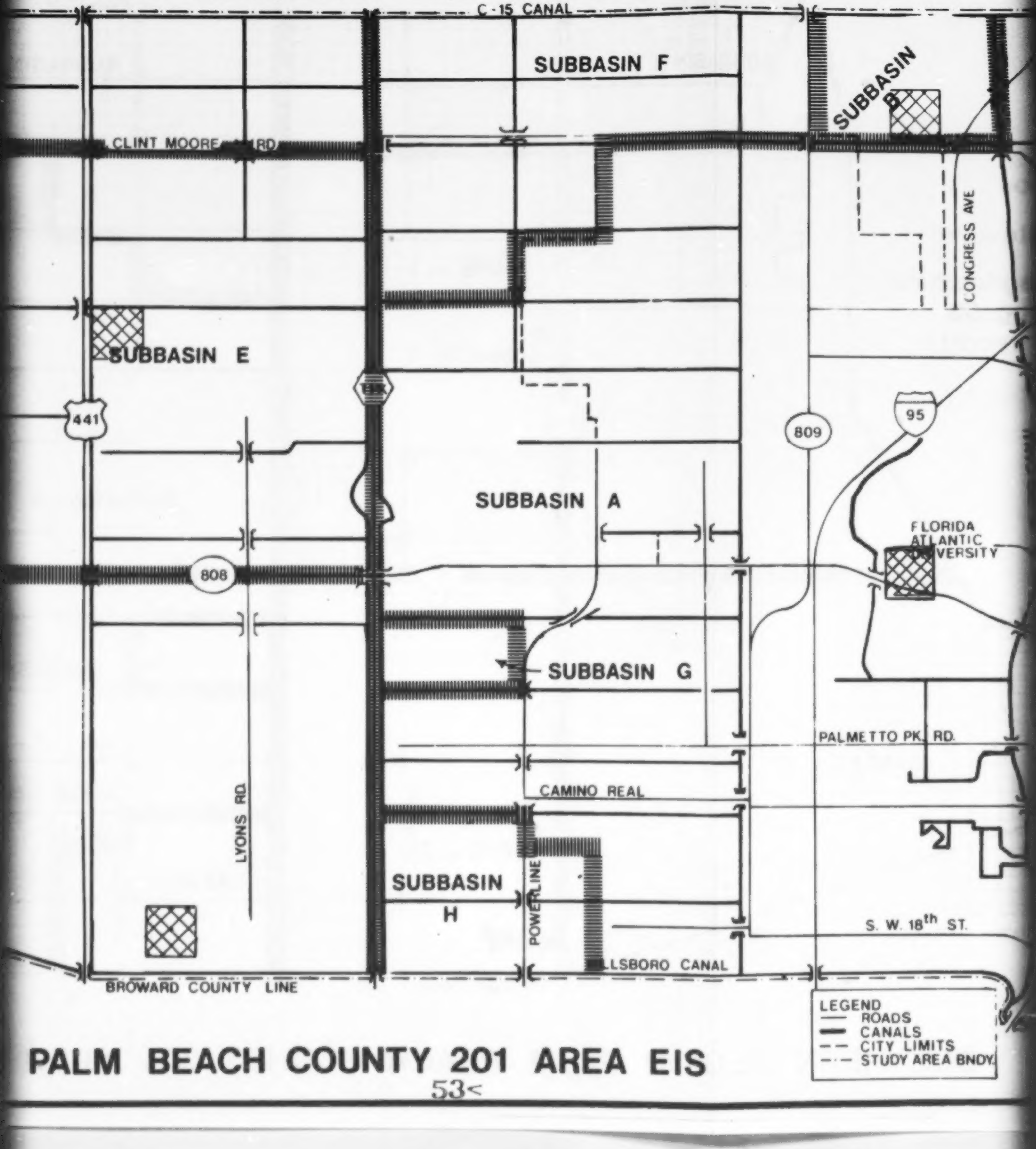
WASTEWATER T


Legend
subbasin limits
wwtp
regional pumping station
force main, raw wastewater
SUBBASIN I
CLINT MOO
SUBBAS
441
CONSERVATION AREA 1 LEVEE
SUBBASIN C
BROWARD

SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

SOUTHERN REGION PALM BE

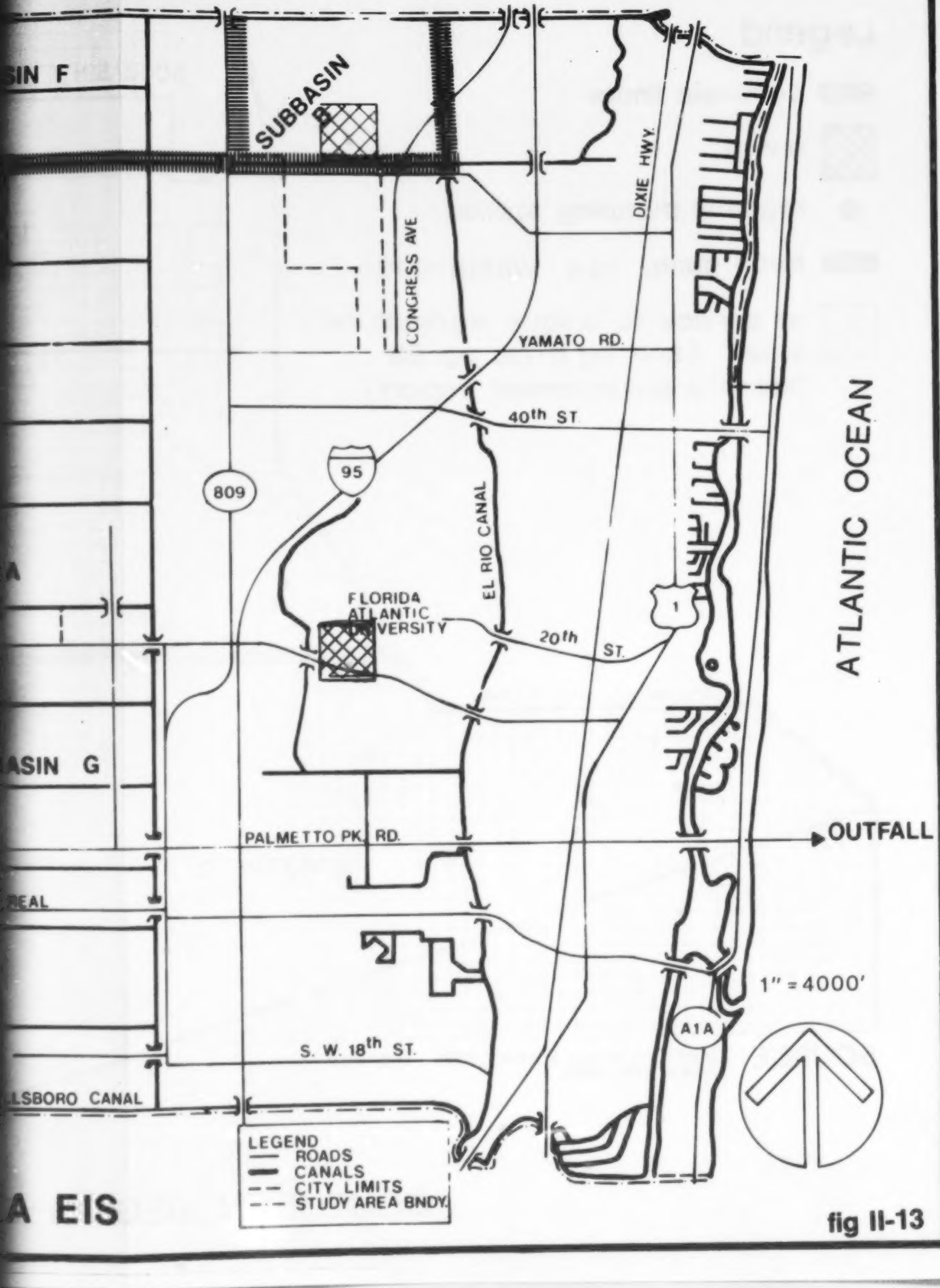
EWATER TREATMENT SYSTEM - ALTERNATIVE 8


C-15 CANAL
SUBBASIN F
SUBBASIN B
CLINT MOORE RD
CONGRESS AVE
SUBBASIN E
441
809
95
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
808
SUBBASIN G
PALMETTO PK. RD.
CAMINO REAL
LYONS RD.
SUBBASIN H
POWERLINE
S. W. 18th ST.
HILLSBORO CANAL
BROWARD COUNTY LINE
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

PALM BEACH COUNTY 201 AREA EIS

53<

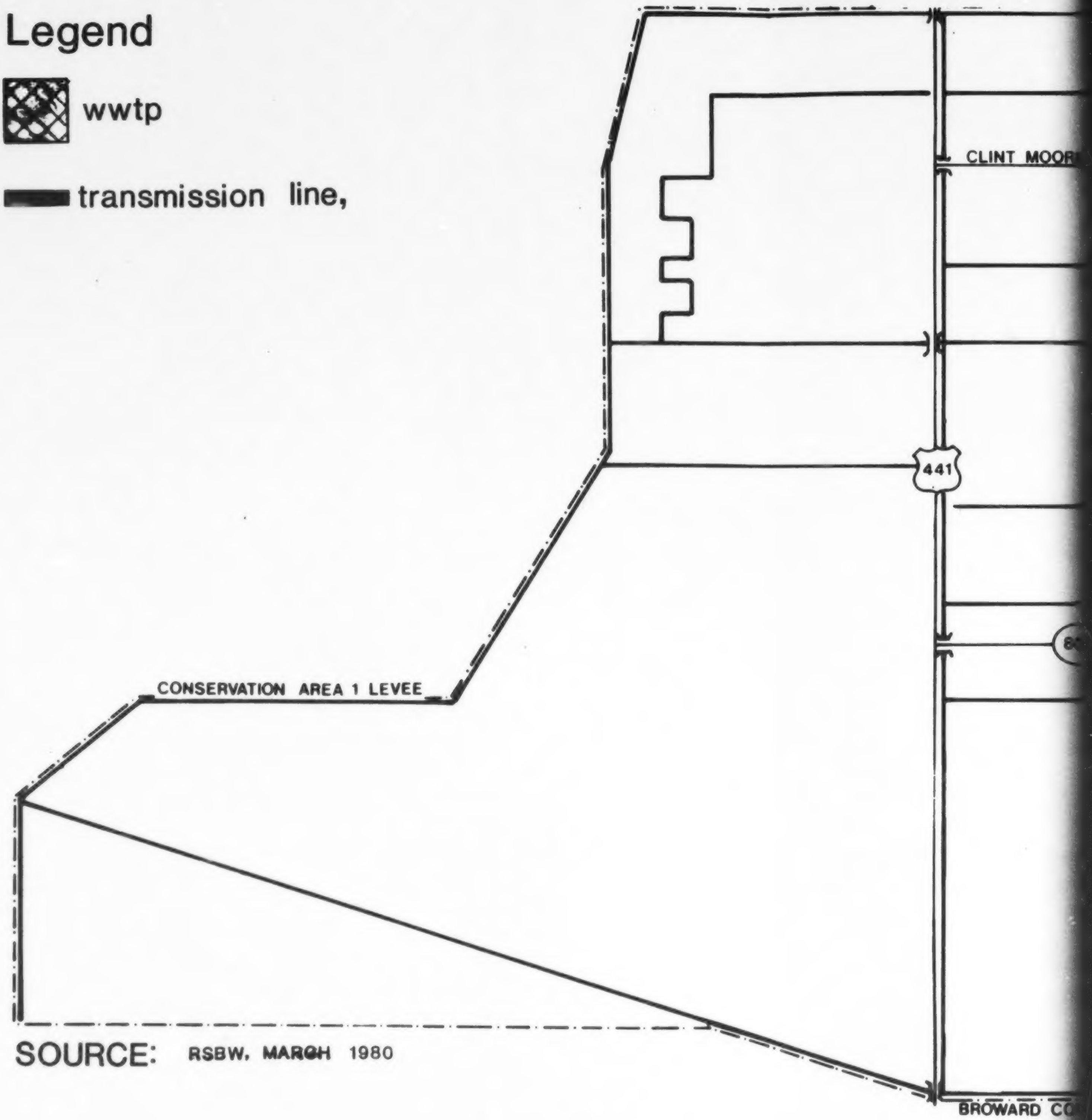
LTERNATIVE 8


SIN F
SUBBASIN B
CONGRESS AVE
DIXIE HWY.
YAMATO RD.
40th ST
95
809
EL RIO CANAL
ATLANTIC OCEAN
A
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
ASIN G
PALMETTO PK. RD.
OUTFALL
REAL
1" = 4000'
A1A
S. W. 18th ST.
LSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

A EIS

fig II-13

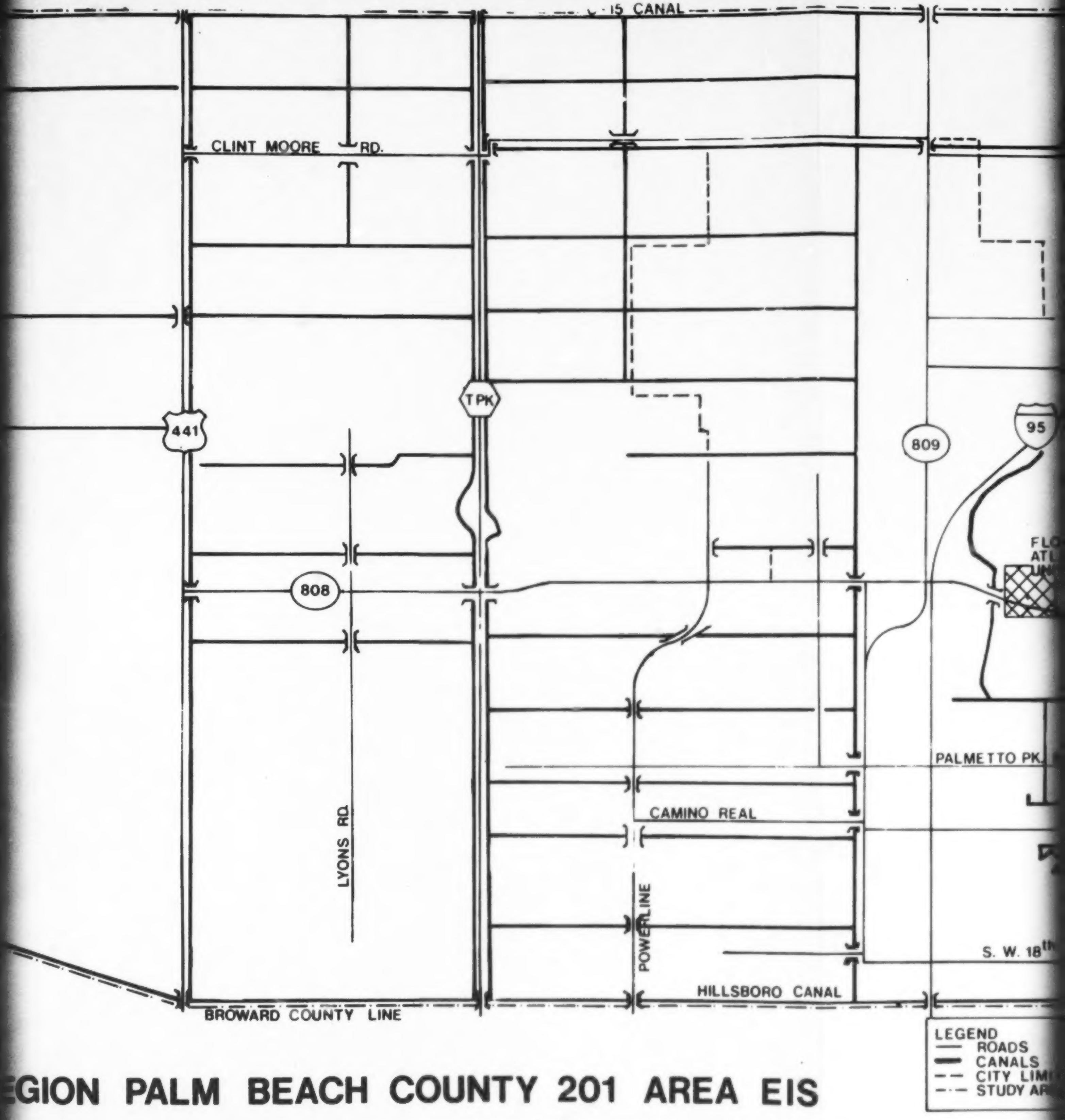
WASTEWATER T


Legend
▨ wwtp
▬ transmission line,
CLINT MOOR
441
80
CONSERVATION AREA 1 LEVEE
BROWARD CO

SOURCE: RSBW, MARCH 1980

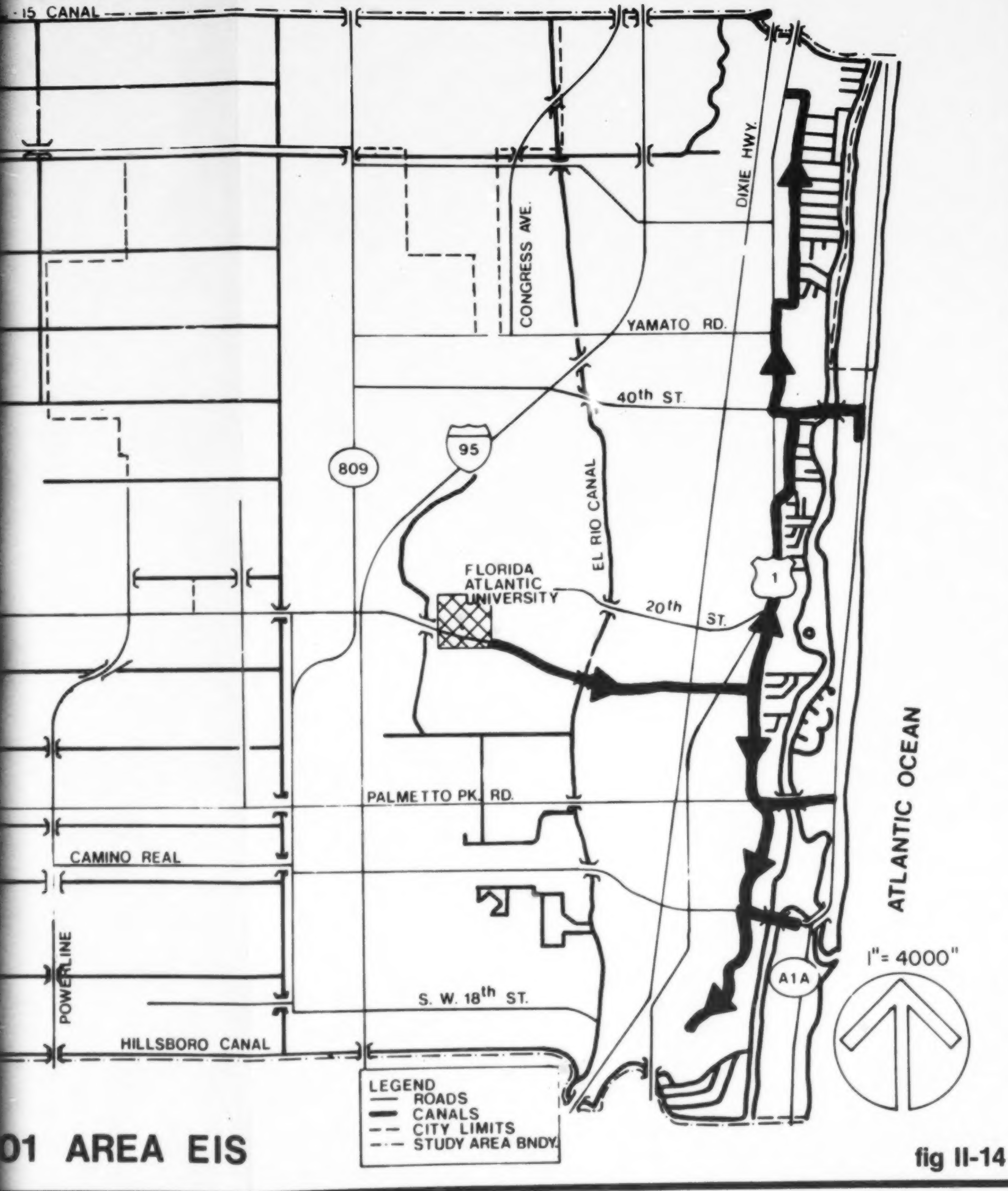
SOUTHERN REGION PALM BEA

WASTEWATER TREATMENT SYSTEM-ALTERNATIVE 9


C-15 CANAL
CLINT MOORE RD.
TPK
441
809
95
808
FLO
ATL
UNI
PALMETTO PK.
CAMINO REAL
LYONS RD.
POWERLINE
S. W. 18th
HILLSBORO CANAL
BROWARD COUNTY LINE
LEGEND
ROADS
CANALS
CITY LIMI
STUDY AR

EGION PALM BEACH COUNTY 201 AREA EIS

TEM - ALTERNATIVE 9


-15 CANAL
DIXIE HWY.
CONGRESS AVE.
YAMATO RD.
40th ST.
95
809
EL RIO CANAL
FLORIDA
ATLANTIC
UNIVERSITY
20th ST.
1
ATLANTIC OCEAN
PALMETTO PK. RD.
CAMINO REAL
POWERLINE
S. W. 18th ST.
HILLSBORO CANAL
A1A
1"= 4000"
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

01 AREA EIS

fig II-14

Part G: Cost Evaluation

A summary of the present worth costs for each alternative is presented in Table II-2. A detailed cost analysis for each alternative can be found in the Southern Region, Palm Beach County 201 Plan.

A major conclusion of the cost analysis is that the alternatives involving spray irrigation are more expensive than those associated with the outfall. This is due to the high cost of land in the area and the fact that the outfall is already in existence.

TABLE II-2

PRESENT WORTH COST OF ALTERNATIVES

ALTERNATIVE	TOTAL PRESENT WORTH ($MILLIONS)
1	26.80
2	39.60
3	26.80
4	36.25
5	48.98
6	34.43
7	26.80
8	28.90
10	21.80

Part H: Implementability

All the alternatives except 4 and 8 require an agreement between the City of Boca Raton and Palm Beach County outlining terms of Boca Raton's agreement to dispose or treat and dispose of Palm Beach County's wastewater. It is expected that the agreements required under each of the alternatives could be worked out to the satisifaction of both local governments.

It is believed that implementability is not a critical element in the selection of the preferred alternative. Each alternaive has been determined to be fully implementable. Clearly, however, alternatives involving land application would be more difficult to implement due to the difficulty in acquisition of land.

PART I: Sludge Management Alternatives

Existing Treatment Facilities

Sludge treatment in South Palm Beach County takes place at existing wastewater treatment plants serving the area. The sludge treated is strictly a domestic type sludge that is generally stabilized and hauled away to a landspreading site in the southwestern part of the service area or a County landfill. Most of the hauling and disposal of sludge is performed by private companies.

Four existing treatment plants treat and process excess sludge within the study area. These are the Glades Road Plant, the Pheasant Walk Plant, the Sandalfoot Cove Plant and the American Homes Plant.

The Glades Road Plant is owned and operated by the City of Boca Raton and provides secondary treatment of wastewater using a conventional activated sludge system. The wastewater treated is a domestic type wastewater with small quantities of compounds associated with industrial processes.

The waste sludge produced at the Glades Road facility consists of a stabilized activated sludge. The plant does not provide primary treatment so all excess sludge originates from the biological treatment process. The waste sludge is aerobically digested and until recently was either hauled away in liquid form or land applied to the grounds adjacent to the plant. However, land application has now been discontinued because there has been evidence of high nitrate concentrations in monitoring wells around the spreading site. Currently, all waste sludge is hauled away in liquid form by a private company.

The Sandalfoot Cove Plant provides secondary treatment of wastewater using the contact-stabilization process, and it produces a sludge very similar in nature to the Glades Road Plant. There are no significant quantities of industrial by-products.

The waste sludge produced at the Sandalfoot Cove Plant undergoes stabilization in the form of aerobic digestion before it is hauled away in liquid form. Since no primary treatment is provided at the plant, all the waste sludge comes from the activated sludge system. This sludge is hauled and disposed of in privately-owned landfill sites.

The American Homes Plant provides secondary treatment plus alum addition for suspended solids removal in tertiary filters and lime addition for phosphorus removal. Effluent is used to irrigate nearby golf courses.

The waste sludge produced at this plant consists of a combination of biological sludge produced by a conventional activated sludge system and a chemical sludge generated by addition of lime and alum to the plant effluent for suspended solids and phosphorus removal.

The combined sludge is aerobically digested and then hauled away to a sludge disposal site.

The Pheasant Walk Plant provides secondary treatment using conventional activated sludge. No primary treatment is used at this facility. Excess sludge produced from the treatment process is aerobically digested and dewatered in sludge drying beds. Dewatered sludge is hauled to the Lantana landfill in West Palm Beach.

Solids Characterization

An estimate of the expected quantities of wastewater solids has been developed by the 201 consultant in order to evaluate costs and to determine the need for other resources to process these quantities.

The general procedures devised to estimate future solids quantities involved the use of existing data and trends. Sludge production quantities are reported on a yearly average basis and a maximum 30-day basis. The latter is used as design criteria for sizing sludge treatment and disposal processes.

Estimated sludge production through the year 2000 is based upon the following criteria:

a. Projected flow, BOD, and SS concentrations reported in the Third Interim Submittal.

b. Effluent quality based on providing a minimum of secondary treatment for ocean disposal.

c. Primary sludge production is based on 50 percent removal of suspended solids.

d. Secondary sludge production is based on 0.87 lb. of waste solids/lb. of BOD removed for the activated sludge process.

e. Volatile solids content of the sludge is 75 percent. Anaerobic digestion achieves a 40 percent reduction of volatiles, resulting in 0.7 dry lbs. of digested sludge/dry lb. of raw sludge.

Sludge production estimates for Alternative 1 and Alternative 8 are presented on Table II-3. Alternative 1 consists of complete regionalization, further defined as centralization of all treatment at the existing Glades Road Plant. Alternative 8 consists of facilities serving the City of Boca Raton service area exclusively. Based on the trends in flow, BOD, and SS concentrations exhibited during the period 1977-1981 the sludge production during the maximum month is expected to be substantially greater than the yearly average solids production as shown on Table II-3.

Sludge characteristics were also considered in evaluating sludge management alternatives because they could dictate special treatment and disposal practices. Of utmost concern on the Federal and State level are such parameters as heavy metals and PCB.

Heavy metal quantities for the sludges inthe study area are expected to be low compared to other cities in the country. The low heavy metal concentrations can be attributed to the lack of industry in the study area. The heavy metal concentration of the City of Boca Raton sludge is typical of a domestic type wastewater and within Federal and State guidelines for heavy metals. Based on State of Florida classification for heavy metals, the sludge generated within the study area is expected to be Class I or II depending on the treatment rendered.

Final Disposal Options

The final sludge disposal or utilization scheme is important and takes precedence in the planning process because it usually dictates what particular solids handling processes are feasible. To determine which final disposal alternatives would be selected for the study area a number of possible alternatives were investigated. First, however, a discussion of existing disposal practices and existing facilities is presented.

TABLE II-3

SLUDGE PRODUCTION FOR SOUTH PALM BEACH PLANNING AREA

(DRY TONS PER DAY)

	1985	1990	1995	2000
1. Average Yearly Production				
A. Alternative 1 Service to entire study area.	6.6	10.1	12.9	15.0
B. Alternative 8 Service to subbasin A.	4.9	6.7	7.8	8.9
2. Maximum Monthly Production				
A. Alternative 1 Service to entire study area.	11.6	17.8	22.7	26.4
B. Alternative 8 Service to Subbasin A.	8.7	11.9	13.9	16.3

The South Palm Beach County area, as well as most of Palm Beach County disposes of residual solids generated in treatment plants in county operated landfills or in private land through contracts with private haulers. There are currently two county landfills. The Lantana Landfill, the southernmost of the two landfills and nearest to the study area, is only expected to operate through 1982. Due to problems in obtaining sites for a replacement landfill, no immediate plans for a south county landfill are in progress.

The North County landfill, called the Dyer Landfill, will require upgrading and expansion to meet service area needs through 2000. Plans are underway to expand the Dyer Landfill.

A private hauling contract is feasible as long as the costs of hauling liquid sludge do not become excessive and provided the private haulers meet all government regulations for land disposal of liquid sludge. The City of Boca Raton as well as many other surrounding municipalities have liquid sludge hauling contracts with private firms. Private haulers are not equipped to haul dewatered sludge.

Final sludge options were listed and scrutinized in order to develop appropriate treatment schemes for each respective final disposal option. The final disposal options took into account existing conditions as well as recommended plans for the local area. Also considered were local, State, and Federal guidelines affecting the disposal/utilization of residual solids from treatment plants.

Final disposal/utilization options considered for further screening are:

1. Landfilling
2. Dedicated land disposal
3. Co-disposal
4. Land reclamation
5. Land application on agricultural land (nonedible crops)
6. Distribution as soil amendment
7. Horticulture

A summary of the initial screening process follows:

(a) Landfilling

Landfilling meets all the criteria for a reliable, feasible final disposal alternative. The landfill to be used would be the upgraded Dyer Landfill in Palm Beach County. This landfill is approximately 35 miles from the Glades Road Treatment Plant in Boca Raton. Although the Palm Beach County 1979 Comprehensive Solid Waste Management Plan recommended a South County landfill, efforts to site this landfill west of Delray Beach have not materialized due to heavy public opposition. For purposes of this study, therefore, landfilling operations are assumed to take place in an upgraded Dyer Landfill.

(b) Dedicated Land Disposal

Dedicated land disposal is not considered acceptable as a reliable long-term disposal option. It is estimated that at least 800 acres would be needed for dedicated land disposal. This option is not considered acceptable because sites to accomodate such a facility are not readily available, and purchase costs would be prohibitive (over $15 million) due to the high purchase costs for land in the Boca Raton area.

For purposes of this study tracts currently being used by private firms to spread sludge are considered to be dedicated land disposal. This type of operation is presently reliable but its long-term reliability and cost effectiveness are questionable in light of expected future costs of fuel and land and expected land development pressure. Dedicated land disposal is therefore dropped from further consideration in the analysis.

(c) Co-Disposal

Co-disposal is considered an attractive option of final disposal and will be evaluated in further detail. Discussion with City of Boca Raton representatives revealed that the City is seriously considering incineration of refuse and sludge, economies of scale can be achieved so co-disposal is an attractive alternative. It is also attractive because of the sludge volume reductions achieved, in light of expected long hauls to the disposal site. This system can be reliable, and space requirements for such a facility are available at the Glades Road Complex. Therefore, it will be considered in the more detailed analysis.

(d) Land Reclamation

Land reclamation is considered to have potential as a parallel or secondary system. This option does not meet criteria for reliability. The criteria requires an option to be reliable at all times under all circumstances. The characteristics of the study area are not such that a large scale long-term land reclamation project can exist. This option will be considered to have potential as a parallel or secondary system. Possible land reclamation projects are pedestrian footpaths and bikepaths for the City of Boca Raton.

(e) Land Application

Land application is not considered acceptable as a disposal option for various reasons. First, costs for purchase of the required land is expected to be in the millions. Secondly, potential sites do not exhibit adequate physical characteristics. Lastly, the costs of transporting sludge to potential sites is expected to be high because of the distance between the plant and potential sites.

(f) Distribution as a Soil Amendment

Distribution as a soil amendment is considered to have some potential as a parallel utilization option. The initial or pilot phase of such a program would be controlled by a municipal entity until enough testing and operation of the system established the by-product safe for less controlled distribution. Communication with City of Boca Raton Parks and Recreation staff revealed that the first phase of this program could perhaps be supported by the Parks and Recreation Department and local golf courses. This utilization option would parallel processes which utilize landfilling as the final disposal option. Those processes which use co-incineration are considered incompatible with a parallel composting system.

(g) Horticultural Use

Use of properly stabilized sludge as a soil amendmant in home gardening is only considered as a potential parallel or secondary option with some reservations. A soil amendment distribution program on low human contact areas should precede a horticulture program to determine any potential hazards of the product. Controlled distribution would be limited to moderate contact areas owned by municipal entities or area golf courses.

Based on the initial screening conducted the following disposal/utilization options are considered adequate for long-term use for the study area.

- Landfilling; preceeded by dewatering as well as incineration
- Co-disposal; with resource recovery and possible land reclamation of residue

Potential secondary or parallel systems considered adequate for seasonal short term yearly use are:

- Land reclamation of ash residue on City bikepaths;
- Distribution of compost as a soil amendment on City-County lands with minimum human contact. This would be phased from an initial full scale pilot program of controlled distribution on City land and area golf courses.

Solids treatment processes considered in this report were tailored around disposal/utilization options considered adequate herein for long-term use and those parallel, secondary options.

The 201 Plan describes in detail final disposal/utilization options and solids handling processes considered compatible with final disposal/utilization options.

Solids Management Alternatives

Solids management alternatives were formulated based on final disposal/utilization options considered adequate for long-term use. They include landfilling, preceeded by dewatering as well as incineration, and co-disposal, with resource recovery.

Solids management alternatives are grouped according to series. Series I alternatives provide solids treatment and disposal/utilization of solids for the entire service area at one regional facility at the existing Glades Road complex, in Boca Raton. Series II alternatives provide solids treatment and disposal/utilization for just the City of Boca Raton service area at the Glades Road complex.

The preferred alternative in this EIS consists of a configuration that renders service exclusively to the present City of Boca Raton service area. This configuration would be eligible for federal grant funds. Service to the County areas outside of Boca Raton service area is not completely ruled out in EPA's EIS but would not be grant eligible.

For purposes of the solids management alternatives, however, the two series of alternatives were evaluated.

Series I alternatives represent a scenario where the City and the County have reached an agreemnet to regionalize wastewater treatment at the Glades Road complex. This configuration has certain economic advantages to those users who ultimately pay for its inception and operation. Besides centralization of facilities, which promotes a more efficient system, economies of scale are realized. This means that the unit cost per customer is less than if several smaller facilities with a total treatment capacity equal to the larger facility were built and operated. This economy of scale is inherent to wastewater treatment facilities and is well recognized as one advantage of regionalization.

Series II alternatives represent a scenario where the City of Boca Raton would receive federal funds to expand its treatment facilities in order to serve its existing service area only. Service to Palm Beach County areas would be excluded from the regional treatment plant at Glades Road. Palm Beach County would treat its own wastewater at existing plants throughout the area. As growth ensued, these plants would be expanded without federal funding, or the County could contract with the City of Boca Raton to treat its wastewater at the Glades Road complex. Any required upgrading attributable to the County growth, however, would not be eligible for federal funding.

Series II solids management alternatives are identical in process configuration to their counterpart letter identifier in Series I. A lesser quantity of solids is evident, however, in Series II because the number of people served is less.

Even though Series I and II counterparts are identical, both series of alternatives were analyzed to ensure that solids management alternatives considered did not exhibit any obvious diseconomies for increases or decreases in design capacity. Some equipment exhibits certain economic benefits at certain treatment capacity so there can be some economy or diseconommy of scale between different sizes of the same type of equipment.

The ultimate goal of this analysis was to select a cost-effective solids management alternative from Series I and II.

Series I and II Alternatives

Alternatives 1A, 1B, 1C, and 1D employ thickening-anaerobic digestion-dewatering and landfilling. Composting is considered a secondary utilization alternative because it does not meet reliability criteria established in the analysis. Resource recovery of methane gas would be employed for alternatives 1A, 1B, 1C, and 1D.

Alternatives 1E and 1F employ thickening-heat conditioning-dewatering-incineration and landfilling. Incineration would take place in fluidized bed reactors. Ash and residual would be hauled to Dyer landfill. Steam generated from the incineration process would be used in the heat treatment conditioning and to generate electric power through use of steam turbines.

Alternatives 1G and 1H would employ thickening, conditioning by use of heat, dewatering and co-disposal. Co-disposal of sludge and refuse would take place in modular combustion units (MCU's). Steam generated from the co-disposal process would be recovered to produce electric power and to heat condition sludge. Ash and residual from the MCU's would be landfilled or used as subbase for bicycle paths throughtout the City as part of a resource recovery process. Alternatives 1G and 1H differ only in the amount of refuse processed. Alternative 1H has a 1:1 ratio of wet sludge to refuse while Alternative 1G has a 2.3:1 ratio of refuse to wet sludge. These cases were considered to illustrate the economy of scale gained in co-disposal for sludges when the refuse:sludge ratio increases.

Alternative 1I employs thickening-chemical conditioning-dewatering-co-disposal of sludge and refuse. A wetter cake, however, is delivered to co-disposal, requiring larger MCU's. The sludge to refuse ratio used is 1:2. This is the minimum ratio considered acceptable by the 201 consultant. Resource recovery of steam from the co-disposal process would be used to produce electricity.

Series II alternatives are identical to Series I alternatives with the only exception that solid quantities are less because service is limited to the City servie area only, instead of the entire service area.

Cost-Effective Analysis of Solids Management Alternative

A cost effective analysis of alternatives in Series I and Series II was performed to enable selection of alternatives with lowest-cost characteristics. Table II-4 represents cost data on the least-cost alternatives for solids management from each series. The table shows the least-cost alternative, the total capital cost, annual operating and maintenance costs, and unit costs for sludge processing.

Table II-4 shows that in either Series, alternatives using centrifuge or belt filter press dewatering followed by co-disposal or landfilling have the lowest cost.

Alternatives employing heat conditioning were not found competitive because of the high costs of purchase and installation associated with the equipment and largely due to the expectation that titanium heat exchangers in heat treatment units will be needed to prevent chloride corrosion.

TABLE II-4

COST SUMMARY FOR LOWEST COST SOLIDS MANAGEMENT ALTERNATIVES

SERIES 1

	DESCRIPTION	SITE	TOTAL CAPITAL COST	ANNUAL O&M COST	TOTAL UNIT COST $/DRY TON(1)	UNIT COST RATIO
1A	Digestion-Belt Filter Press (BFP) Dewatering-Land Filling	Glades Road WWTP	$11.5	$0.53	$258	1.0
1B	Digestion-Centrifuge Dewatering-Land Filling	Glades Road WWTP	$11.8	$0.56	$268	1.04
1I	BFP Dewatering-Co-Disposal	Glades Road WWTP	$11.4	$0.78	$263	1.02

SERIES 2

	DESCRIPTION	SITE	TOTAL CAPITAL COST	ANNUAL O&M COST	TOTAL UNIT COST $/DRY TON(1)	UNIT COST RATIO
2A	Digestion-Belt Filter Press (BFP) Dewatering-Land Filling	Glades Road WWTP	$ 7.9	$0.36	$294	1.0
2B	Digestion-Centrifuge Dewatering-Land Filling	Glades Road WWTP	$ 8.8	$0.37	$310	1.05
2I	BFP Dewatering-Co-Disposal	Glades Road WWTP	$ 7.9	$0.59	$321	1.09

(1) Includes resource recovery.

Alternatives employing heat conditioning were not found competitive because of the high costs of purchase and installation associated with the equipment and largely due to the expectation that titanium heat exchangers in heat treatment units will be needed to prevent chloride corrosion.

Cost effective alternatives employing resource recovery of steam and/or methane has are even more attactive than Table II-4 shows because certain hidden advantages are not apparent in the cost-effective analysis. One advantage not readily discernible from the cost data is the expected increases in electrical cost. The analysis did not consider the effect of inflation. Those alternatives generating electrical power through resource recovery of steam and/or methane will become even more attractive as electrical costs increase with time. Therefore, cost effective alternatives with resource recovery present additional incentives for selection.

Siting of Facilities for Solids Management Alternatives

In the development of Solids Management Alternatives, the siting requirements of facilities were evaluated to insure the feasibility of each alternative.

Both Series I and II Solids Management Alternatives involve the expansion of the Glades Road Wastewater Treatment Plant to some degree. This discussion, therefore, concentrates on the suitability of the Glades Road Site for siting of proposed sludge treatment facilities.

The Glades Road complex is situated just east of I-95 and north of Glades Road in Boca Raton. The complex contains both water and wastewater treatment facilities owned and operated by the City of Boca Raton. The entire parcel of land contains approximately 57 acres. The City is presently considering the purchase of an additional 8 acres bordering on the northwest corner of the property. The land is bordered by Florida Atlantic University to the east, the Boca Raton Airport to the north, I-95 to the west, and Glades Road to the south.

Land available for siting of treatment facilities includes about 4 acres to the southwest of the existing aeration tanks and about 10 acres northwest of the aeration tanks. An additional 8 acres of land could be made available to the City if negotiations to buy adjacent land are successful. The land is considered adequate to support proposed liquid and sludge treatment facilities, miscellaneous requirements such as access roads, greenspace, buffer areas, and parking.

Recommended Solids Management Alternative

The recommended solids management alternative was selected from Series I and Series II alternatives. Alternatives with total costs within 15 percent of each other are considered equal for purposes of this study.

The Environmental Protection Agency has selected a configuration consisting of a modified "no-action" alternative as the desired alternative for this region. The desired alternative consists of funding only wastewater facilities needed to serve the City of Boca Raton service area. County areas outside the City's service area will not be eligible for federal funding when new treatment facilities are constructed.

Even if the County contracts for treatment with the City, there will be no federal funding eligibility for any associated expansion at Glades Road needed to serve the County.

The County has two choices with regards to the future of their wastewater facilities. Existing facilities can be upgraded to meet future growth in their service area, or existing facilities can be abandoned and the County can contract with the City for treatment and disposal. Since federal funding will not play a role in either option, other considerations such as in-house economic impacts, environmental impact, implementability, and staffing requirements should be used by the County to select which option is most attractive.

The recommended sludge management plan consists of Alternatives 2A, 2B or 2I. These three alternatives are considered equal in cost-effectiveness.

If the City of Boca Raton decides to install MCU's to handle solid waste it is recommended that Alternative 2I be implemented. This alternative consists of thickening waste activated sludge, storage of blended thickened waste activated sludge and primary sludge in covered tanks, dewatering on belt filter presses and centrifuges, and co-disposal. This alternative has a slightly higher cost than alternatives 2A and 2B, but its resource recovery potential (steam) is much greater. The cost difference can be made up by resource recovery of steam many times over if electric energy inflation rates prevail.

If the City does not elect to implement MCU's in their solid waste program, alternatives 2A or 2B are the recommended plan based on their overall cost-effectiveness. The only difference between these alternatives is the dewatering method employed. Alternative 2A employs belt filter presses for dewatering while alternative 2B employs solid bowl centrifuges. Dewatered sludge is landfilled in both alternatives. Pilot studies should be conducted to select between these two alternatives and to acquaint the operating staff with actual operational results.

If for any reason the County decides to contract with the City in the future for wastewater treatment the Series 2 solids management alternative would serve as the core for a larger system.

The same sludge treatment train as recommended in alternatives 2A or 2B would be utilized for the scenario where the City and County contracted for treatment at Glades Road. No diseconomies were found between the same process alternatives in Series I, so an expansion of Series II alternative 2A or 2B to higher capacity (1A or 1B) would still represent a cost effective system.

If a program to construct modular combustion units does not materialize for the City, composting of dewatered sludge should be tested for its marketability as a secondary utilization/disposal option alongside landfilling. The advantages of composting are the reduction in volume of sludge delivered to the landfill, hence a savings in tipping fees, and potential for use as a soil conditioner. The finished compost could perhaps be marketed to produce revenues.

CHAPTER III - AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES AND MITIGATIVE MEASURES

Part A: Introduction

This chapter summarizes the existing natural and man-made environment of the Planning Area, discusses the environmental impacts of the alternatives and proposed possible measures to mitigate these impacts. The purpose of the environmental setting summary is the establishment of existing baseline conditions in the area. The impacts of the various alternatives, including the no Federal action alternative, are gauged against these existing conditions.

Part B: Affected Environment and Environmental Consequences of the Alternatives

Population

The rate of population growth in Palm Beach County has consistently exceeded that of Florida and the United States for the last three decades. This growth, which exceeds national growth by 40% and state growth by 15%, is primarily due to in-migration.

The fastest growing segment of the County's population is the over 65 age group with approximately one in every five county residents falling into this category. This compares with one in every ten nationally.

About 3 percent of Boca Raton's residents are black as compared to 13 percent for the County and 15 percent for the State. Very few Hispanic residents are present within the Planning Area.

Total population for the Planning Area was estimated to be 76,153 in 1980. This was divided between 62,596 in the City service area and 13,557 in the County service area. Total population is expected to grow to 257,566 in the year 2000. This will include 158,151 within the City service area and 99,415 within the County service area.

Disaggregations of future population estimates by the sub-basins shown in Figure II-1 are presented in Table III-1.

TABLE III-1

DISAGGREGATIONS OF ESTIMATED FUTURE POPULATIONS

	Estimated Subbasin Population For Future Years				
Subbasin(1)	1980	1985	1990	1995	2000
A	62,596	86,485	119,179	138,758	158,151
B	374	709	2,689	4,891	5,493
C	10,397	15,946	24,917	30,857	34,352
D	382	606	1,042	1,240	1,315
E	696	3,166	9,961	17,328	24,721
F	679	2,454	4,698	7,973	9,932
G	141	836	1,854	2,605	3,361
H	669	3,342	7,054	9,784	12,477
I	219	994	3,129	5,442	7,764
Total	76,153	114,538	174,523	218,878	257,566

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(1) See Figure II-1 for subbasin locations.

All of the alternatives will provide 75% Federal funding for the total year 2000 population projections except Alternatives 3, 8, and 10. All of these alternatives would provide for less population on the unique agricultural lands in Palm Beach County. However, Palm Beach County land use control policy has so far encouraged almost total conversion of these agricultural lands to urban uses. Most of the area has already been zoned for residential development at densities which would require centralized sewer service. Even some areas projected for less extensive development in the Palm Beach County Comprehensive Plan have been given development approvals. A continuation of the current development policy in the County will lead to almost complete development of the Planning Area within the next 20 years.

It is doubtful that the County or major developers would let the lack of Federal funding for wastewater treatment and disposal alter this growth rate. It is likely that any necessary facilities to service the full projected population level would be provided by 100% local funding.

It is likely that the population densities and locations as well as the total population levels discussed above will be the same whichever alternative is selected. Alternative 7 attempts to preserve some of the unique agricultural lands by increasing densities in other areas to equal the lack of increased population on the agricultural lands. However, County development policy has already committed much of the agricultural lands to urban development and there is no reason to expect any major changes in the direction of this policy.

Economic Conditions

The EIS study area is part of a larger economic region which includes much of southeast Florida, especially Broward and Palm Beach counties. The trade sector is the largest employer in this area while services and trade are the largest sources of wage and salary income. The largest individual employers in the area are IBM and the Boca Raton Hotel and Club. Over half of the income within the planning region comes from sources other than employment. These include income from dividends interest and rent, and transfer payments. These two indications identify the economy of the area as basically tourist-retirement in nature.

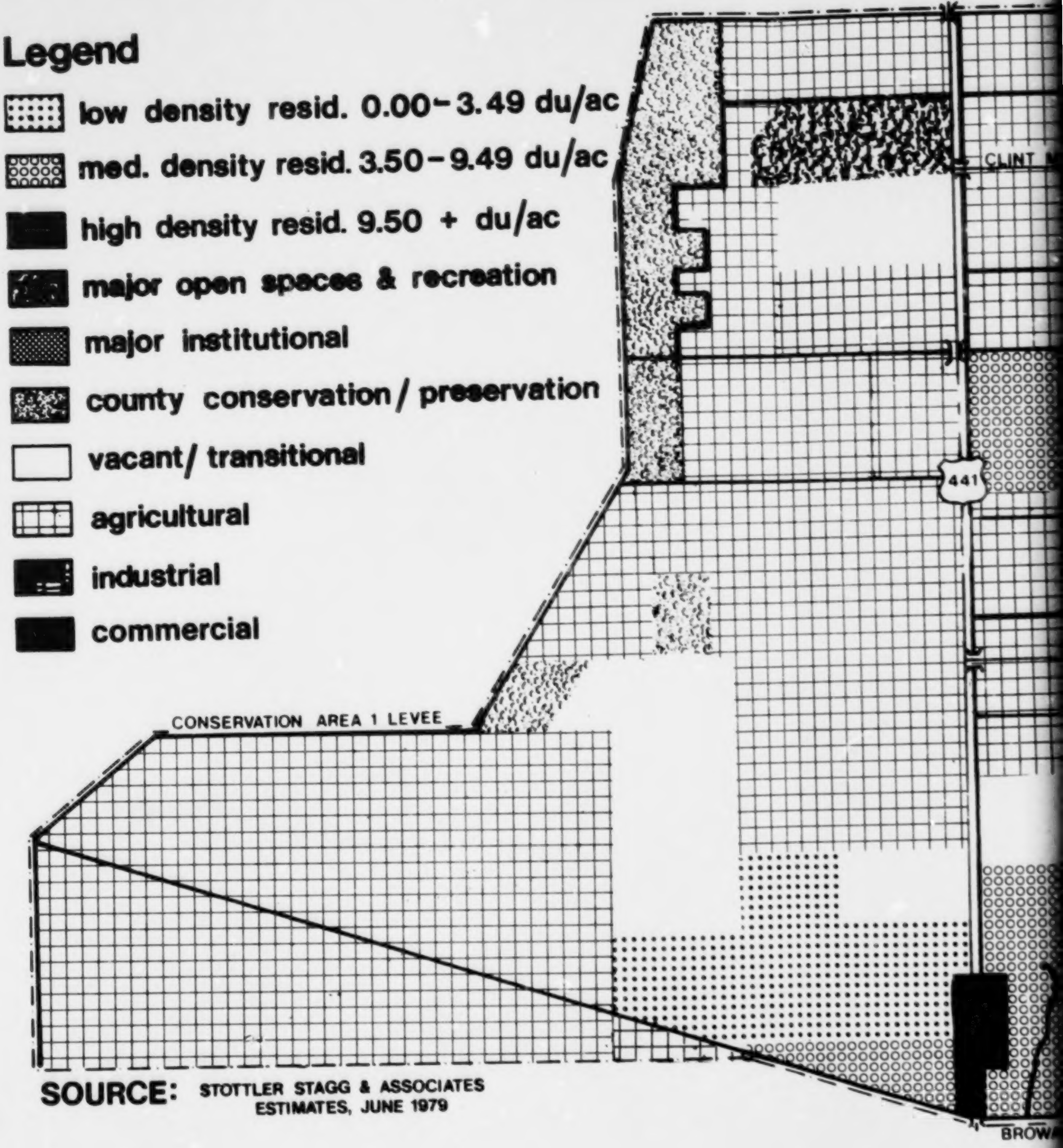
An important economic trend is the decline in agriculture in the two counties. Over the past two decades, agricultural activity has steadily moved out of Broward and the urbanizing portions of Palm Beach County. This has resulted in a decline in the percentage of total income and employment from agriculture in these two counties.

The continued expansion of the wastewater treatment system is necessary for the continuation of the current high level of residential and associated construction activity. This expansion would be provided in all the alternatives except Alternative 3, the no Federal action alternative. The implementation of Alternatives 7, 8, and 10 would help to slow the continued decrease in economic activity related to the agricultural industry. However, the development strategy currently being carried out by local government in the area will almost certainly lead to continued development throughout the Planning Area. This will mean continued expansion of the construction industry and local service economy and continued decline in the agricultural industry.

Land Use

The existing land use pattern is shown in Figure III-1. In areas where land uses are mixed, only the predominant use is shown. Large residential development project land uses are shown as the average residential density for the particular project. Areas where construction is underway are shown as being completed. This figure, as well as subsequent ones within in this section, is broadly generalized. Detailed information regarding specific land use classification within large mixed use developments is available from the local planning departments.

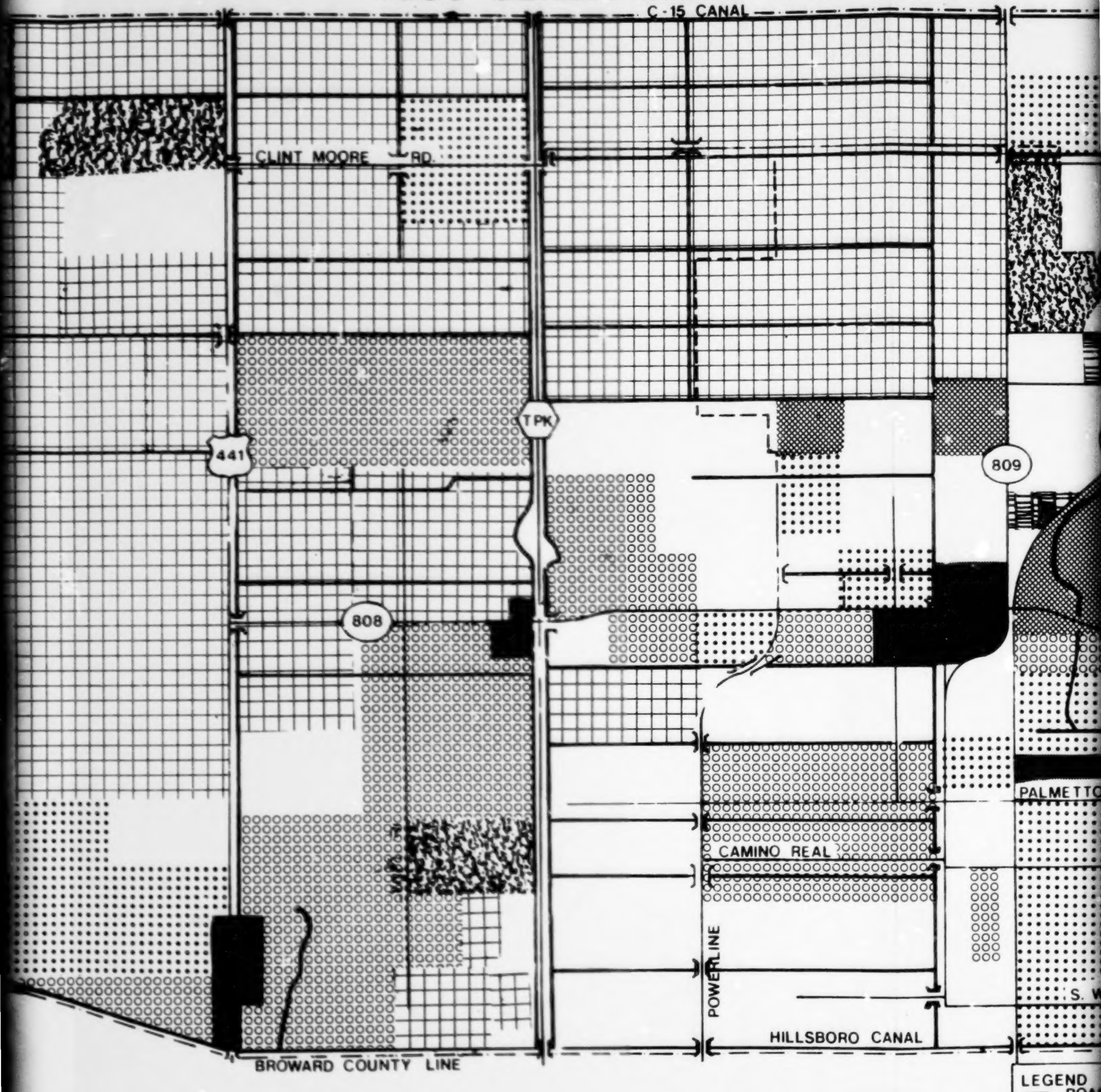
Existing urban development is concentrated east of I-95. High-density residential development predominates along the sourthern portion of AlA. There are smaller areas of high-density residential use in the northeast portion of the city, adjacent to the south side of Spanish River Park, in the Sandalfoot area and in Century Village.


Legend
low density resid. 0.00–3.49 du/ac
med. density resid. 3.50–9.49 du/ac
high density resid. 9.50 + du/ac
major open spaces & recreation
major institutional
county conservation / preservation
vacant/ transitional
agricultural
industrial
commercial
CONSERVATION AREA 1 LEVEE
CLINT
441
BROW

SOURCE: STOTTLER STAGG & ASSOCIATES ESTIMATES, JUNE 1979

SOUTHERN REGION PALM

1980 GENERALIZED LAND USE


C-15 CANAL
CLINT MOORE RD.
441
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POWERLINE
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HILLSBORO CANAL
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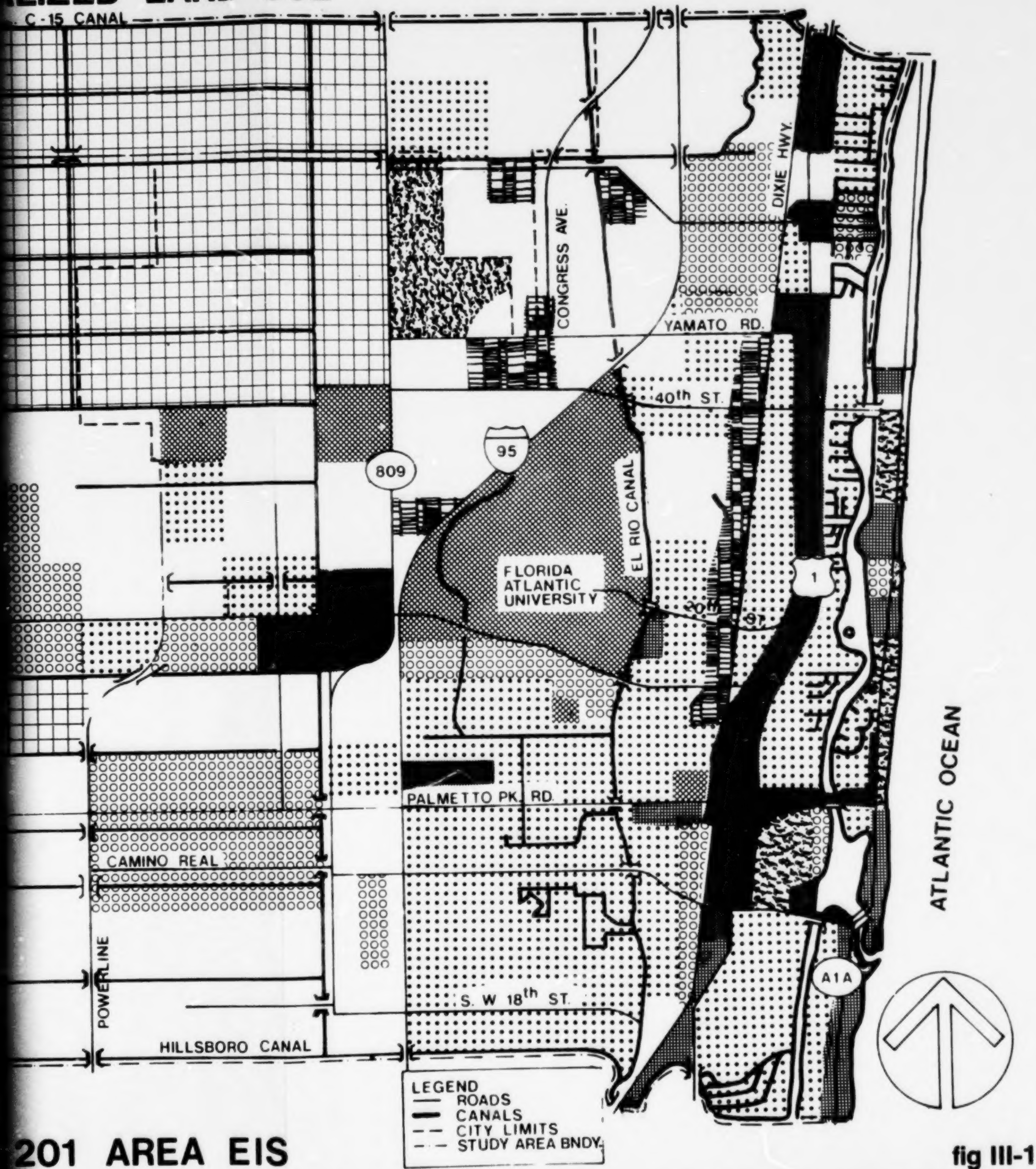
REGION PALM BEACH COUNTY 201 AREA EIS

ALIZED LAND USE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DIXIE HWY.
CONGRESS AVE.
YAMATO RD.
40th ST.
95
809
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
PALMETTO PK. RD.
CAMINO REAL
POWERLINE
S. W 18th ST.
HILLSBORO CANAL
A1A
ATLANTIC OCEAN
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

201 AREA EIS

fig III-1

Medium-density residential development within the City is located south of Florida Atlantic University (FAU), adjacent to the central business district and within the U.S. 1-Dixie Highway corridor. The central Reserve Area has medium-density developments closely associated with large open space areas. There are also medium-density areas adjacent to Century Village and Sandalfoot. As of February 1979, there were 674 duplex dwelling units and 10,837 multi-family dwelling units within the Boca Raton limits.

Low-density residential development is the principal land use in the developed areas. The area west of the Turnpike has several large single-family subdivisions under development, generally in close proximity to U.S. 441. The Reserve Area is characterized by housing developments interspersed within semi-public golf courses and other recreation facilities. The Pheasant Walk subdivision has completed 146 homes as part of a 1,500-unit project.

Single-family development dominates most of Boca Raton. The largest concentrations are in the southern and eastern portions of the City. High-value housing is generally located around waterways, principally the Intracoastal Waterway, open spaces and the beach. As of February 1979, there were 10,837 single-family dwelling units in Boca Raton.

The average price of a new dwelling unit in the area in 1978 was $75,000.

Commercial land uses are directly associated with major thoroughfares. The Sandalfoot area has strip neighborhood commercial uses along U.S. 441. There is a neighborhood commercial area at the intersection of Glades Road and the Turnpike. A major office center and general commercial area is under development at Glades Road and Military Trail. An office center-shopping center development is expanding at 1-95 and Palmetto Park Road. There are a wide variety of office buildings, typical strip commercial uses, and four major shopping centers on the seven-mile strip of U.S. 1 within the Planning Area. There are three large hotels located in close proximity to the Inlet.

In 1967, the City had 8.51 acres of commercial land use per 1000 population. In 1978, there were 8.55 acres of commercial land use per 1000 population. Based on this information, 2,203 acres of commercial land will be needed in the Year 2000. Approximately 1376 acres of existing and zoned commercial land currently exists.

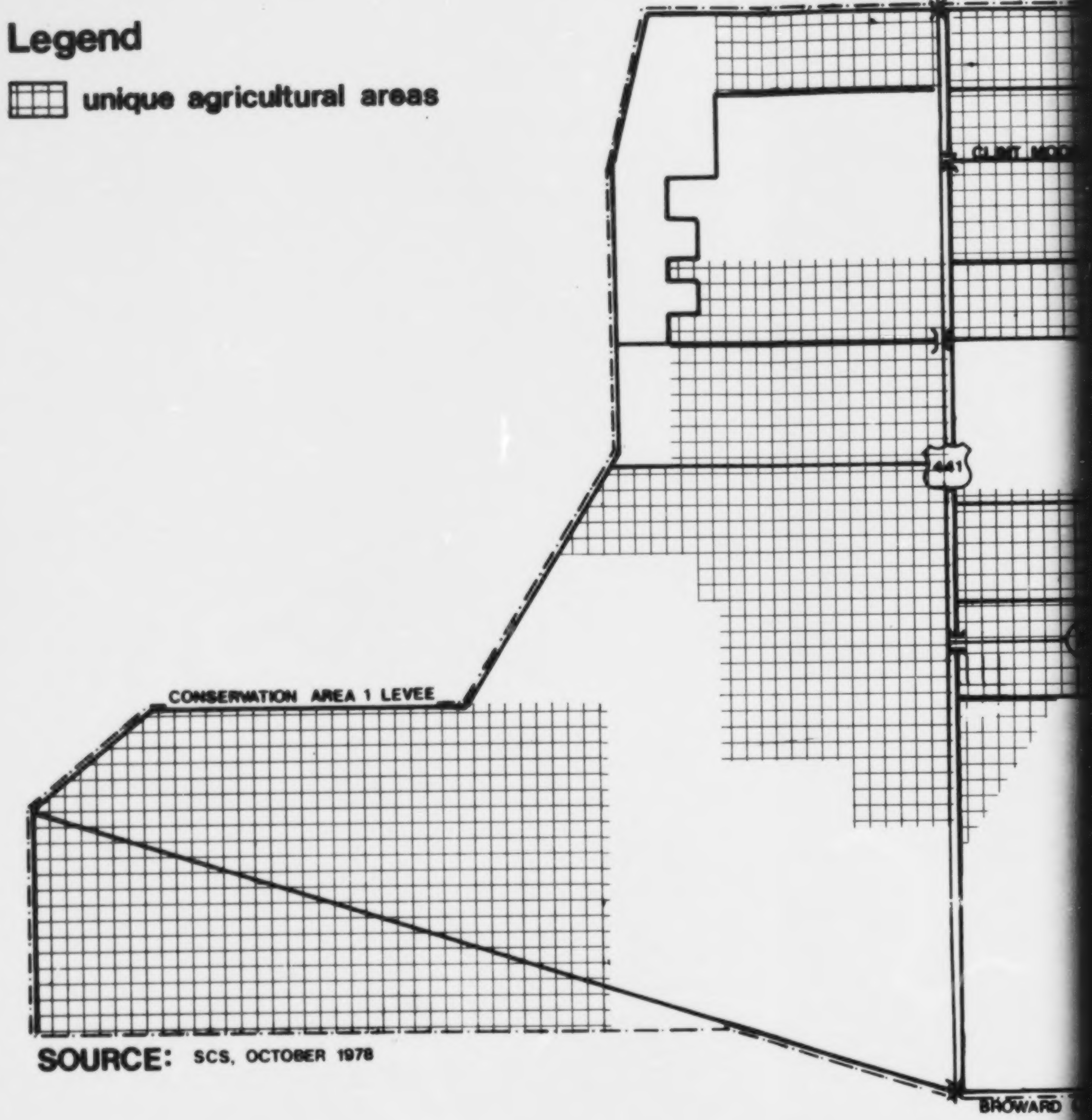
Industrial uses are located between NW Second Avenue and the F.E.C. Railroad between 51st Street and Palmetto Park Road. IBM, the study area's largest employer, has a light manufacturing-office facility on Yamato Road west of I-95. Four light manufacturing facilities are scattered throughout the developing industrial park north of the IBM facility. There are no industrial land uses elsewhere in the Planning Area.

In 1967, there were 6.01 acres of industrial land use per 1000 population within Boca Raton. By 1978 this ratio had declined to 5.80 acres per 1000 population. Based on this information, 1,494 acres of industrial land will be needed in the Year 2000. Approximately 1,845 acres of industrially built and zoned land currently exist.

The major institutional land use is FAU, a state-supported institution with the full range of graduate and undergraduate programs. The current enrollment approximates 8,000 on its 1,200-acre campus. There are numerous religious institutions scattered throughout the area with the Bibletown development adjacent to the Community Center being the largest.

All of the public recreation facilities, with the exception of the Loxahatchee National Wildlife Refuge and a small neighborhood park in University Park, are located east of I-95 between 40th Street and Palmetto Park Road. There are 325 acres of park and playfield facilities. In addition, the City owns 177 acres of beachfront property and the County has acquired an 11-acre park site adjacent to the south side of the Inlet.

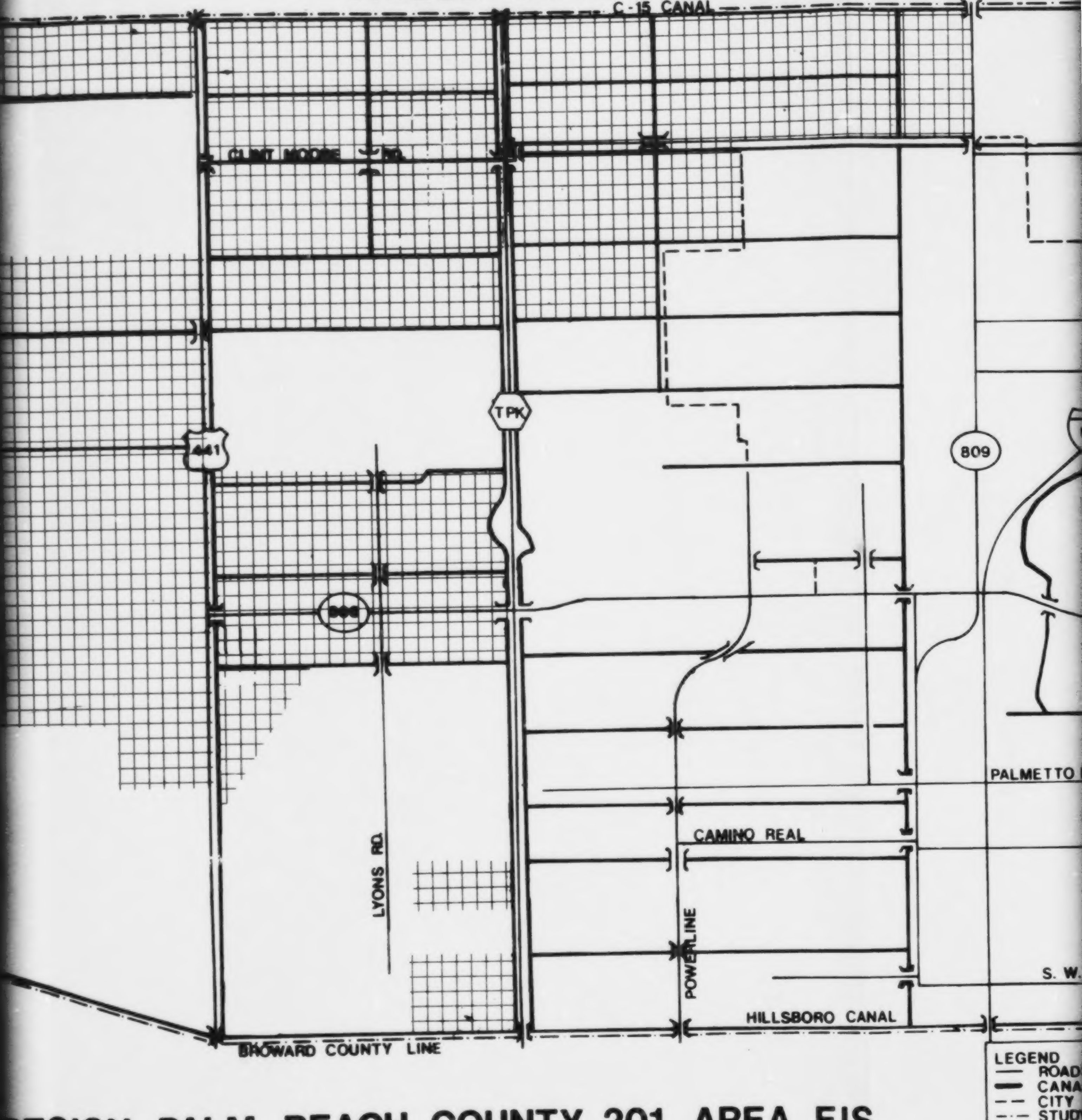
There are 11,000 acres (1978) of land with agricultural exemptions in the western and north-central portions of the Planning Area. Pasture lands predominate west of the Sandalfoot area except for the southwesternmost portion of the Planning Area. Approximately 4,000 acres of the 11,000 acres are occupied by winter vegetable crops. The Palm Beach County Cooperative Extension Service has estimated that the value of the winter vegetable crops in the Planning Area alone exceed $20 million annually. Eastern Palm Beach is the northernmost limit of the Florida winter vegetable crop. See Figure III-2 for a map of unique agricultural lands as identified by the Soil Conservation Service.


Legend
▦ unique agricultural areas
CLINT MOO
441
CONSERVATION AREA 1 LEVEE
BROWARD

SOURCE: SCS, OCTOBER 1978

SOUTHERN REGION PALM BE

UNIQUE AGRICULTURAL AREAS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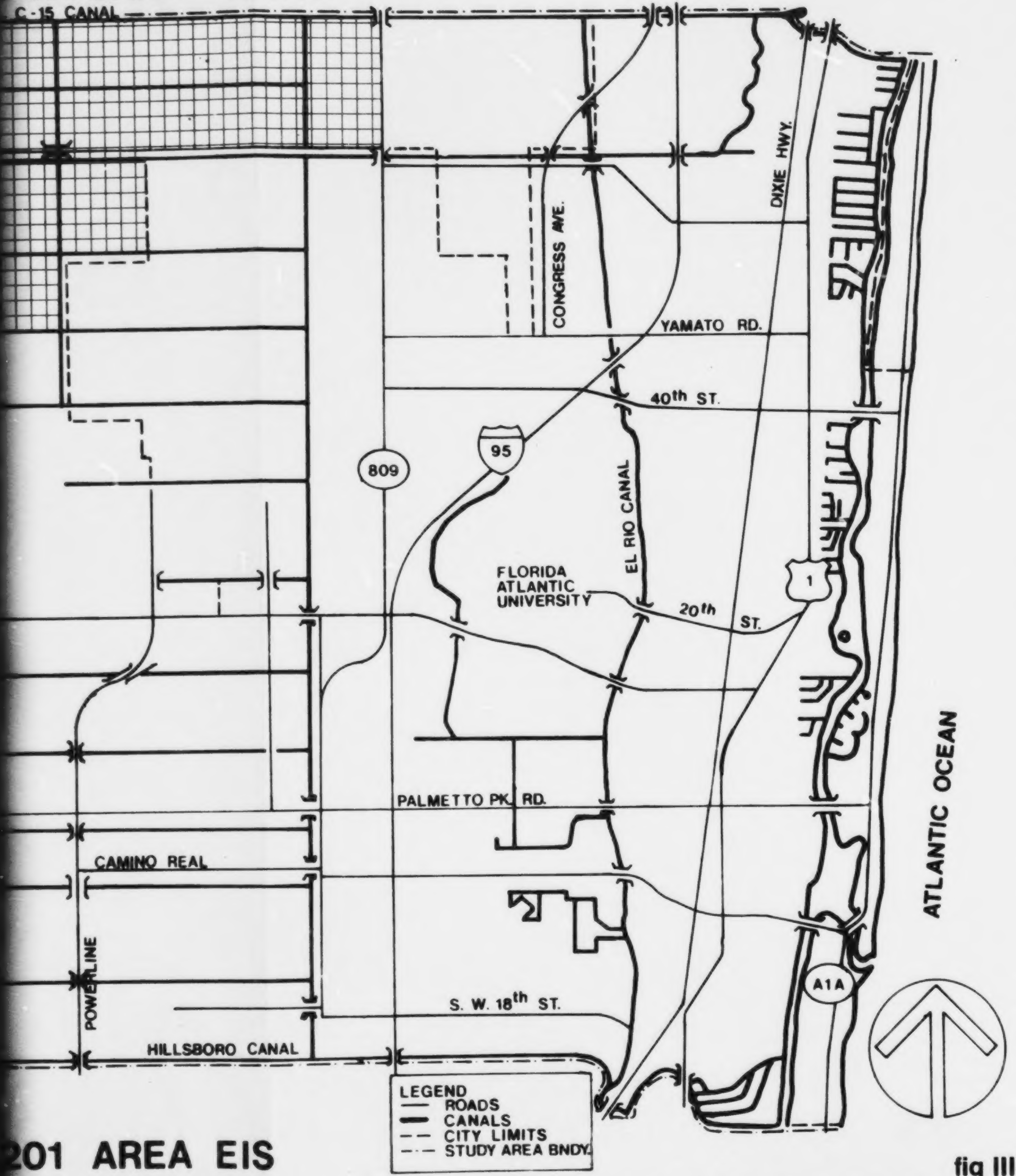
REGION PALM BEACH COUNTY 201 AREA EIS

CULTURAL AREAS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UNIVERSITY
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PALMETTO PK. RD.
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ATLANTIC OCEAN
POWERLINE
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STUDY AREA BNDY.

201 AREA EIS

fig III-2

Existing planning and land development control is vested in the City and the County. Both agencies have a variety of land use development regulations that provide for drainage, tree protection, recreation sites and other similar considerations within their subdivision and zoning ordinances.

Both Boca Raton and Palm Beach County have adopted Comprehensive Plans. These Plans promulgate policies that control the development of land uses, housing, transportation, recreation, sanitary sewer, solid waste, drainage, potable water and utilities. The Plans also include Conservation, Intergovernmental Coordination and Coastal Zone Protection policies.

The planning efforts of the City and the County are supplemented by the Area Planning Board of Palm Beach County (APB) and the Treasure Coast Regional Planning Council (TCRPC). Both organizations are funded by Federal, state, and local sources. TCRPC includes Palm Beach, Martin, Indian River, St. Lucie and Okeechobee Counties.

By far the most significant future land use trend is the almost total destruction of winter vegetable crop production. The County's Comprehensive Plan shows that only the southwesternmost seven square miles of the Planning Area will remain in agricultural use. That portion of the area north of the Hillsboro canal is used as pasture while the portion south of the Canal is primarily used for winter vegetable crops.

An examination of available data shows that there are enough existing units and dwelling units within approved projects to accommodate more than the year 1995 projected population. The County has approved and recommended by current zoning 30,347 more units than necessary to accomodate the Year 2000 population.

The reader should be aware that projects often do not build out to their authorized capacity. The respective comprehensive plans are not necessarily limiting their recommendations to the Year 2000. That is, at least in the case of Boca Raton, the limit is a desired population level which may be reached after the Year 2000.

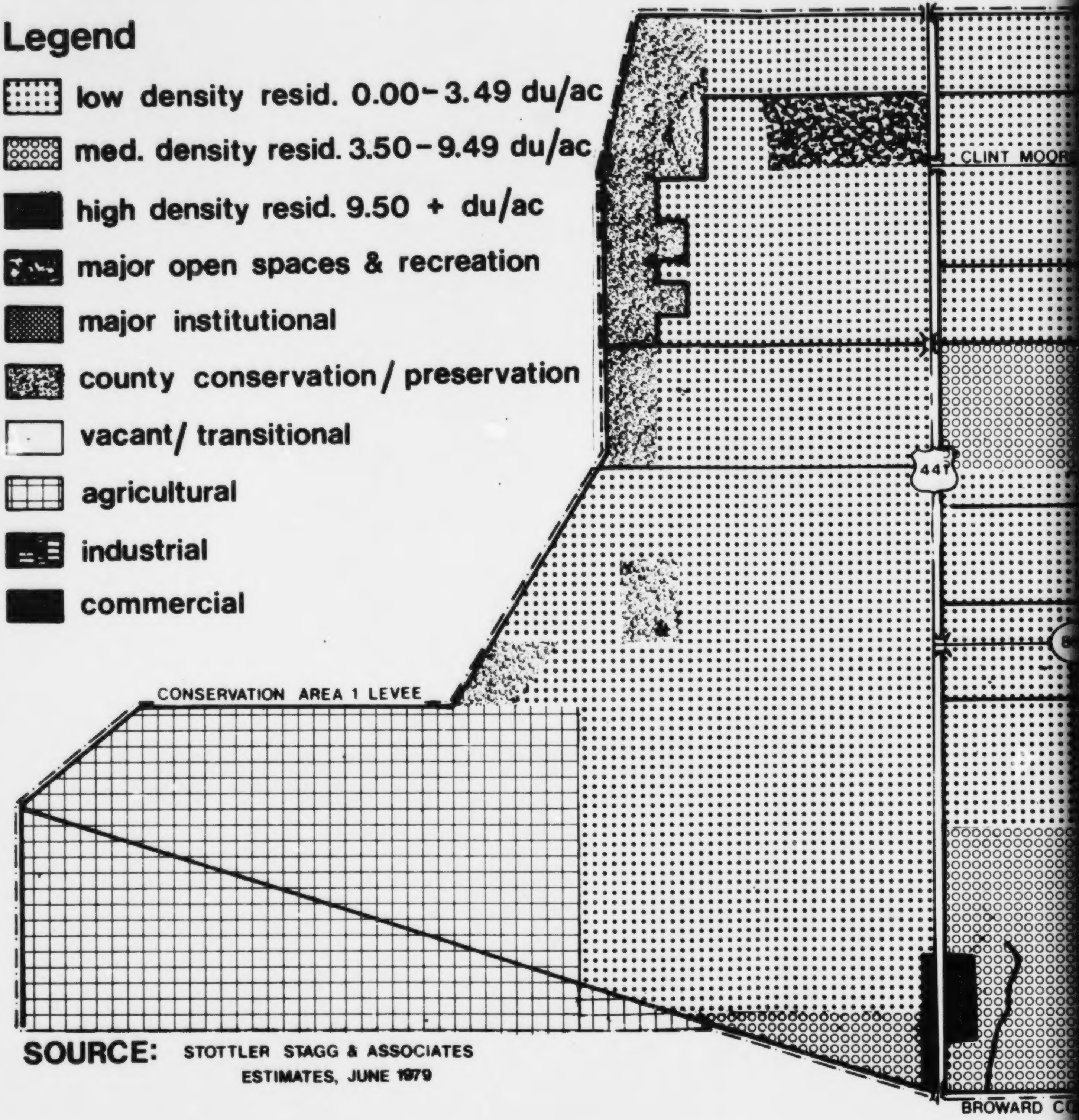
Future commercial land uses will fill in the remaining vacant Federal Highway frontage. A regional shopping center was recently completed at Glades Road and Military Trail. Several of the large land developments have neighborhood/convenience areas within the projects.

Figure III-3 graphically depicts the anticipated land use patterns for the Year 2000. The reader is cautioned that these maps represent summarization of information provided by the City and the County and should not be used for site analysis.

The following statements summarize the land use section:

- Approved and projected development will convert 11,000 acres of unique agricultural to urban use.
- Existing and approved projects contain more dwelling units than the projected needs for the year 1995.
- The total number of units in the Planning Area exceeds the projected year 2000 needs.
- The total number of dwelling units will accomodate a population of 336,458 or a 23 percent increase above the current population projections for the Year 2000 assuming all the projects build out to the extent planned.

Table III-2 shows the approximate number of residences in 1980 within 500, 1000, 2000 and 3000 feet of the regional pump stations and treatment plant sites. The estimates were developed by using January 1979 aerial photography and windshield verification in February 1980. The estimates presented are accumulative. The Sandalfoot plant has some strip commercial uses within 3000 feet of the plant. The Pheasant Walk plant has eight light industrial uses within 3000 feet of the site.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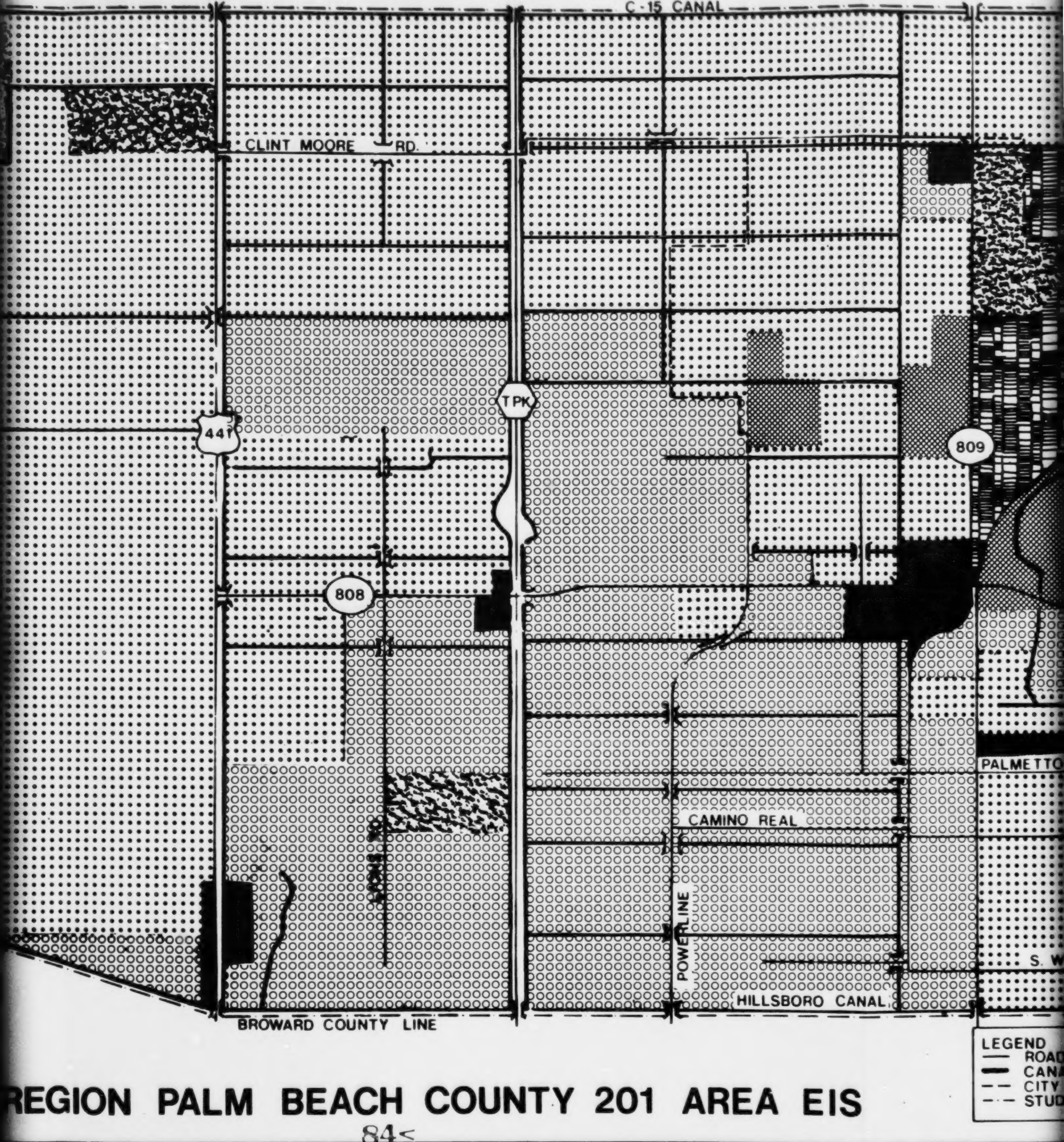
med. density resid. 3.50-9.49 du/ac
high density resid. 9.50 + du/ac
major open spaces & recreation
major institutional
county conservation / preservation
vacant/ transitional
agricultural
industrial
commercial
CLINT MOOR
441
CONSERVATION AREA 1 LEVEE
BROWARD C

SOURCE: STOTTLER STAGG & ASSOCIATES ESTIMATES, JUNE 1979

SOUTHERN REGION PALM BEA

2000 GENERALIZED LAND USE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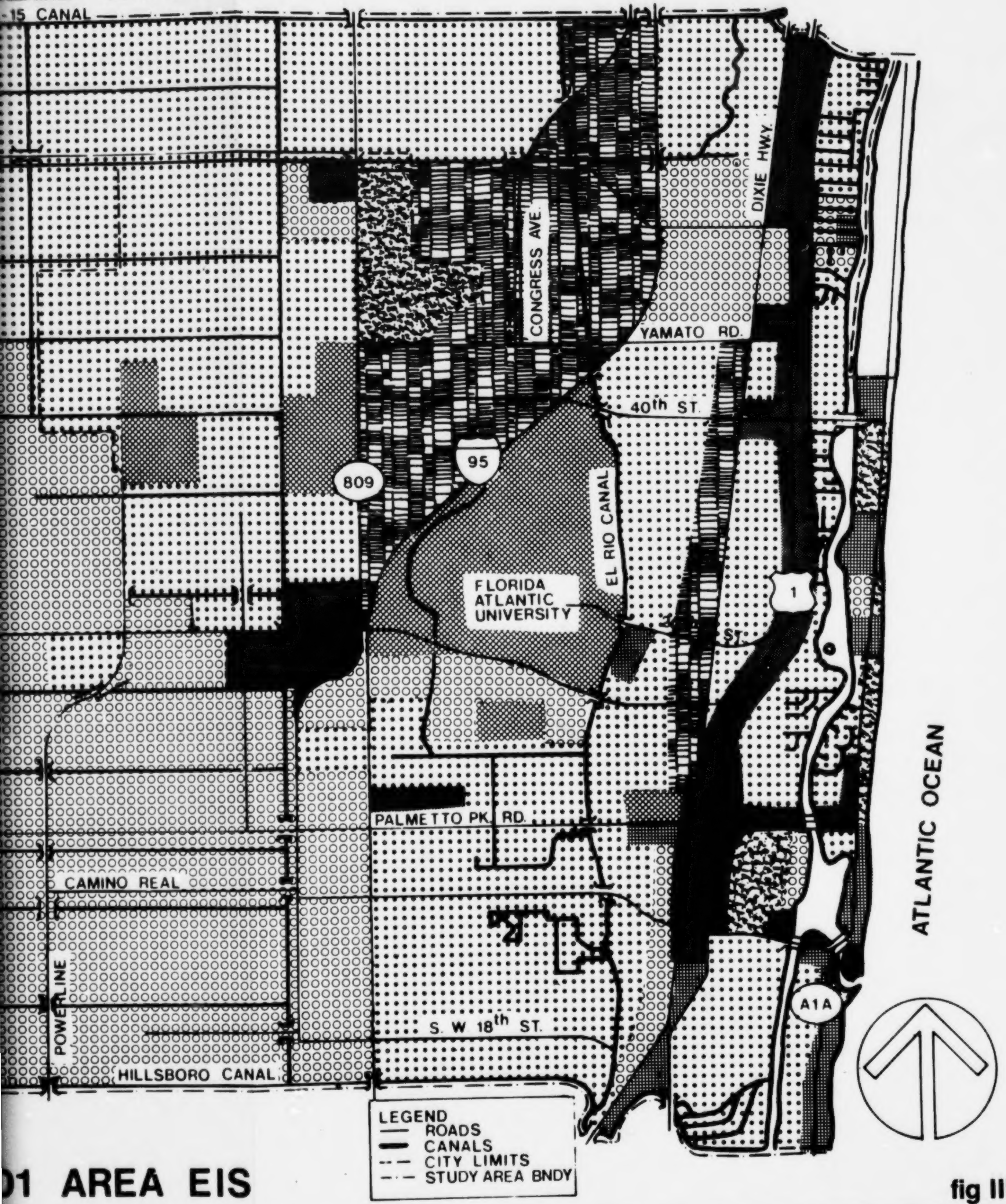
REGION PALM BEACH COUNTY 201 AREA EIS

IZED LAND USE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CAMINO REAL
POWERLINE
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LEGEND
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CITY LIMITS
STUDY AREA BNDY

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fig III-3

Table III-2
LAND USE PROXIMITY (1980)

	500 Ft.	1000 Ft.	2000 Ft.	3000 Ft.
RPS 1 (American Homes)	30	122	384	525
RPS 2 (Sandalfoot)	13	294	1527	3040
RPS 3 (Pheasant Walk)	12	49	101	191
WWTP (Glades Road)	--	--	123	632

Source: January 1979 Aerial Photography
SSA Windshield Survey, February 1980

The compatibility of the construction and operation of the facilities required by these alternatives is an important consideration. Site clearing, grading and excavation will generate nuisance conditions such as dust, noise and debris. However, these nuisances are temporary conditions and will be limited to the areas adjacent to the construction of the force mains. Since the regional pump stations and treatment plants are on existing sites, no significant site construction will be necessary.

The implementation of any of the alternatives will ultimately result in development reflecting the future land use shown in Figure III-3. Local land use policy indicates that this will be true even if the preferred alternative of no Federal action in the County portion of the Planning Area is implemented. This land use plan shows extensive increases in the amount of residential and commercial development in the area. The major adverse impact of this development will be the conversion of large tracts of unique agricultural land to this residential and associated development.

Three million acres of agricultural land are converted to urban uses each year. A continuation of this trend to the end of the century will seriously effect our traditional role as an exporter of food. Palm Beach County now has major acreage devoted to agricultural production. This County is now coming under increasing development pressure. The County's Comprehensive Plan recommends the protection of some of these areas. The South County area, however, is slated for development rather than protection.

Commmunity Services and Facilities

There are three elementary schools, one middle school, and one high school located in the Planning Area. The three elementary schools contain 21.8, 14.7, and 13.8 students per instructional staff member respectively. The middle school and high school have 22.2 and 21.5 students per instructional staff member respectively. The high school began double sessions in the 1979-80 school year. Land has been dedicated for the construction of a new high school in Northwest Boca Raton.

Law enforcement for the study area is provided by both the City of Boca Raton and the Palm Beach County Sheriff's Department. In 1980, the City and County both had 1.6 officers per thousand population. It is generally accepted that 2.0 officers per thousand population is a reasonable standard.

Fire protection for the incorporated area of Boca Raton is provided by the Boca Raton Fire Department, which operates out of four stations. It has an American Insurance Association fire rating of four. Fire protection for the unincorporated portion of the study area is provided by the independent Del-Trail Fire District. Funds for the District come from an ad valorem tax in the area. Three stations serve the area. The fire insurance rating for the district is nine. Fire insurance ratings are given on a scale of 1 to 10 with 1 being the best.

The Planning Area is served by two libraries. The Boca Raton Public Library is located at 200 N.W. Second Ave. and serves only the residents of the City. The Southwest Branch of the Palm Beach County Library System is located in Sandalfoot Cove Shopping Center.

Refuse waste collection and disposal is provided for residents within the corporate limits of Boca Raton by the City of Boca Raton. Residents in the unincorporated area are served by a private contractor. The City provides twice-a-week backyard collection service for garbage and bi-monthly service for yard trash. The City disposes of approximately 40,000 tons of refuse annually.

Currently, the City does not operate any solid waste disposal facilities but hauls its solid waste to the Lantana landfill and a disposal site near Pompano Beach. Both disposal sites are located outside of the Planning Area. Maintenance facilities for the City's sanitation service are located at Northwest First Avenue and Northwest 25th Street. The City has a total sanitation workforce of 70.

The Palm Beach County Solid Waste Authority was established to plan for development and management of solid wastes in the County. The Plan, adopted in 1979, established a policy of accepting municipal sludge, but will not accept septic tank sludge. A new disposal site between the Turnpike and U.S. 441 north of the Planning Area is being considered. However, no firm plans have been made at this time.

There are no public health or welfare facilities located in the Planning Area. Palm Beach County operates a health facility and welfare facility in Delray Beach and residents of the study area are serviced by these facilities. Boca Raton Community Hospital is a non-profit hospital located at 800 Meadows Road in Boca Raton. Boca Raton Community Hospital is a fully accredited hospital providing inpatient, outpatient and ancillary services.

Municipal administrative facilities for the City of Boca Raton are currently decentralized, with administrative centers located primarily at City Hall, the City Hall Annex, Haggerty Building, Garage Complex and the Fischer Building. These facilities house general administrative-type functions such as personnel, community development, and public works.

County administrative facilities are located outside the Planning Area. There is a south county courthouse annex located in Delray Beach, which houses general administrative-type functions such as building permits, welfare services, housing assistance, health department functions, court services, and licensing services.

86(a) <

The rate of population growth which is projected for the Planning Area will cause a tremendous increase in the demand for community services and facilities. Table III-3 shows the increases in these services and facilities which would be required to keep pace with current capacities per resident. A very significant investment of financial resources would be required to even come close to meeting these needs. The most severe problems in meeting demand will be in the transportation and education systems. If these needs are not met, the overcrowding problems which are now evident will become significantly worse.

Existing land use policy and market conditions in the Planning Area indicate that these population figures will be met no matter which alternative is selected. The County appears willing to provide the wastewater facilities to support this level of growth with 100% local funding if necessary. This policy decision will require extensive public investments in facilities and services in this Planning Area.

Taxes and Budgeting

Table III-4 shows the charges for water and sewer services for the City of Boca Raton system, the Pheasant Walk system and the South Palm Beach Utilities Company (SPBUC) system. For comparative purposes, only the residential rates are shown.

A two-bedroom dwelling unit that uses 10,000 gallons of water in a month will be charged $27.55 in the Pheasant Walk system, $28.34 in the SPBUC system and $9.88 in the Boca Raton system.

Two general purpose governments exist within the Planning Area; the City of Boca Raton and Palm Beach County. Additionally, the study area is serviced by the South Florida Water Management District, the Palm Beach County Library District, the Del Trail Fire Control District and the Lake Worth Drainage District. Other jurisdictions in the Planning Area are the Boca Del Mar II New Community District, the Greater Boca Raton Beach Taxing District and the Palm Beach Solid Waste Disposal Authority. Table III-5 shows these units of government and their FY 1977-78 millage rates. Table III-6 shows the units of government and their expenditures per community service. Table III-7 shows governmental revenues for Boca Raton and Palm Beach County.

Table III- 3
Summary of Selected Impacts

	1980	2000
Average Daily Trips	181,244	728,912
Neighborhood Parks (acres)	36	210
Community Parks (acres)	250	699
Metropolitan Parks (acres)	196	1,395
Regional Parks (acres)	287	1,953
Elementary Schools	4	18
Middle Schools	1	5
Senior Schools	1	4
Hospital Beds	1,047	1,030
Electricity Consumption (KWH Millions Annually)	293	991
Solid Waste (tons/yr)	53,100	221,950
Law Enforcement Officers	134	515
Firemen	144	487
Library-volumes	66,000	257,566
Library-space	11,792	154,540

Source: Baseline Report, January 1980
PBC Planning, Building and Zoning Dept. April 1979

TABLE III-4

RESIDENTIAL WATER AND SEWER RATES

Boca Raton

Water and Sewer Monthly Rates:	
Basic Charge (water)	$ 2.03
Each Thousand Gallons	0.44
First Bathroom (sewer)	2.30
Each Additional Bathroom	1.15

South Palm Beach Utilities Company

Water Monthly Rate:	
First 3,000 Gallons	$ 7.20
Each Thousand over first 3,000	1.32
Sewer Monthly Rate	11.90

Pheasant Walk

Water and Sewer Monthly Rates:	
First 4,000 Gallons	$ 15.75
Each Thousand over first 4,000 up to 10,000	2.00
Each Thousand over first 10,000	1.30

Sources: Palm Beach County Utilities Department, June 1979.
South Palm Beach Utilities Company, May 1979.
Boca Raton Billing Method Public Information Handout, May 1979.

TABLE III-5

GOVERNMENTAL UNITS - MILLAGE RATES

General Purpose	Millage Rate
Palm Beach County	5.981
Boca Raton	6.107
Independent Special Districts	
Regional:	
South Florida Water Management District	0.375
Treasure Coast Regional Planning Council	0.000
Local:	
Greater Boca Raton Beach Taxing District	1.374
Lake Worth Drainage District	special assessment
Palm Beach Solid Waste Authority	0.000
Boca Del Mar II New Community District	0.000
Palm Beach Soil and Water Conservation District	0.000
Palm Beach County School Board	8.300
Dependent Special Districts	
Del Trail Fire Control District	1.700
Library District	0.370
Municipal Taxing District	0.000

Source: Local Government Financial Report, FY 1977-78, State of Florida, Department of Banking & Financing.

TABLE III-6
PUBLIC SERVICE EXPENDITURES

Public Service	Total Expenditures	Study Area Expenditures	$ per Capita	Total % of Budget
Transportation:				
Boca Raton - Streets & Roads	955,815	955,815	16.39	6.5
Palm Beach County - Streets & Roads	8,620,129	1,070,999	60.05	4.0(2)
Palm Beach County - Transit Systems	3,561,056	442,211(3)	6.86	
Airport	-0-	-0-	N/Ap	N/Ap
Public Safety:				
Boca Raton - Police	3,233,950	3,233,950	55.45(2)	13.6
Palm Beach County - Sheriff	14,518,456	484,399	27.16	7.8
Boca Raton - Fire	1,849,412	1,849,412	31.71(2)	10.9
Del Trail Fire District(3)	1,216,200	361,515	20.27	3.3(4)
Sanitation:				
Boca Raton	2,100,170	2,100,170	36.01	8.9
Palm Beach County	1,401,386	173,963	9.75	1.1
Libraries:				
Boca Raton	209,836	209,836	3.60	0.9
Palm Beach County	1,691,189	93,990	5.27	0.9
Parks & Recreation:				
Boca Raton	579,124	579,124	9.93	2.4
Palm Beach County	4,082,785	507,281	28.44	3.9
Beach Taxing District(5)	1,664,976	1,644,976(3)	25.83	100.0

Continued Next Page

TABLE III-6 (continued)
PUBLIC SERVICE EXPENDITURES

Public Service	Total Expenditures	Study Area Expenditures	$ per Capita	Total % of Budget
Health and Welfare:				
Boca Raton	-0-	-0-	N/Ap	0.0
Palm Beach County	17,328,786	2,152,623	120.70	5.2
Schools:				
Palm Beach County	128,131,504	N/Av	1,734.65(6)	N/Av

(1) Private contractor leases from F.A.U.

(2) Based on Boca Raton Population - 58,318; (1980)
Palm Beach County Study Area Population - 17,835.

(3) Based on population of 64,459

(4) County aggregates several districts in budget.

(5) Area East of Turnpike.

(6) Countywide Average.

Sources: Local Government Finance Report, FY 1977-1978, State of Florida, Department of Banking and Finance.

Stottler Stagg & Associates, Estimates, July 1979.

The Annual Report of the Commissioner of Education, 1977-78, Florida Department of Education.

TABLE III-7
GOVERNMENTAL REVENUES
1977-78

	PALM BEACH COUNTY Dollars	%	BOCA RATON Dollars	%
TAXES		39.9%		43.9%
Property taxes	$ 49,665,833		7,663,609	
Franchise taxes	500		1,140,838	
Utility service taxes	-0-		2,114,046	
LICENSES & PERMITS		0.1%		3.7%
Professional/occupational	47,456		116,955	
Building permits	-0-		726,139	
Others	41,466		19,385	
INTERGOVERNMENTAL REVENUE		40.2%		18.8%
Federal grants	35,184,827		303,811	
Federal shared revenue	3,006,094		356,412	
Federal payments in lieu	18,360		-0-	
State grants	2,364,041		266,499	
State shared revenue	9,107,226		1,747,729	
Local grants	296,379		1,373,496	
Local shared revenue	-0-		651,107	
CHARGES FOR SERVICES		14.0%		21.7%
General government	4,454,931		26,671	
Public safety	1,123,964		62,736	
Physical environment	4,998,606		5,061,349	
Transportation	5,057,645		-0-	
Human services	1,048,018		631	
Culture & recreation	277,316		213,414	
Other	341,926		85,322	
FINES & FORFEITURES		0.3%		0.8%
	277,016		213,414	
MISCELLANEOUS REVENUE		5.0%		11.2%
Interest earnings	2,928,664		1,057,505	
Rents & royalties	106,308		-0-	
Special assessments	251,313		-0-	
Compensation for losses	595,925		-0-	
Contributions & donations	2,007,200		1,656,461	
Other	357,194		113,989	
TOTAL REVENUES	124,597,828		24,991,798	

Sources: Local Government Finance Report, FY 1977-78, State of Florida, Department of Banking and Finance.
Stottler Stagg & Associates, Estimates, July 1979
The Annual Report of the Commissioner of Education, 1977-78, Florida Department of Education.

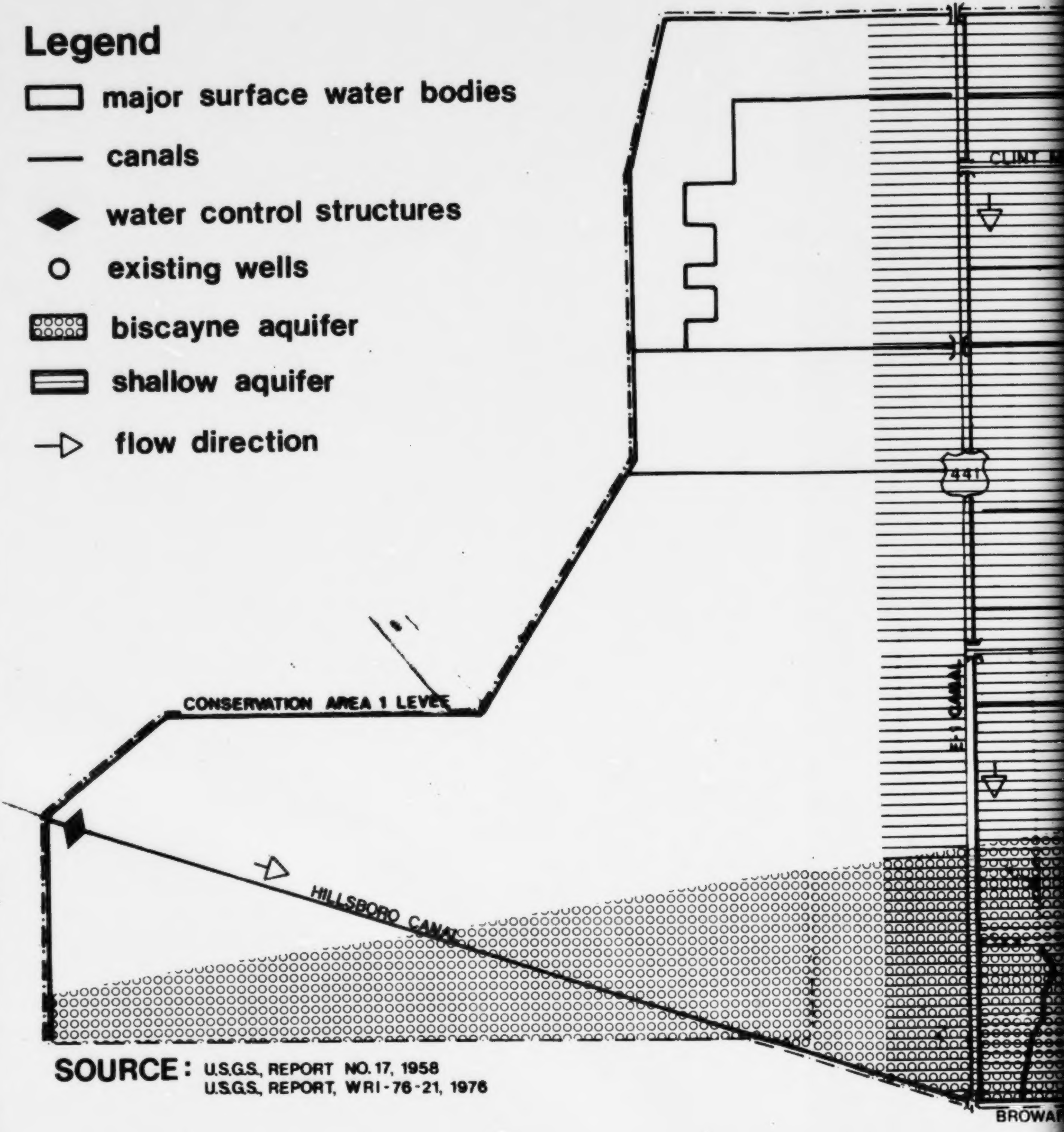
The extensive increases in community services and facilities required to avoid extremely overcrowded conditions will require the expenditure of significant amounts of public funds. These expenditures will probably require increased taxes, even though the tax base will be expanding. The location and rate of development within the unincorporated area is now being controlled by market forces rather than a financially viable public improvements planning program. Similar high growth areas throughout the country have historically been forced to significantly increase taxes if they wished to keep pace with the increased demand on their services and facilities.

Water Quality and Quanitity

The majority of the area drains into the Hillsboro Canal which has an average flow of 212 MGD. The northeastern portion of the Planning Area drains into the C-15 Canal. Both canals discharge into the Intracoastal Waterway. A comprehensive system of lateral canals was established by the Lake Worth Drainage district for irrigation and flood control purposes. The major north-south canals connect the laterals to the Hillsboro and C-15 Canals. All of the canals are hydrologically linked to the groundwater supplies and are designated as Class III waters. The location of these canals is shown in Figure III-4.

Figure III-4 also shows the general location of the Biscayne and Turnpike (shallow) Aquifers. Although the evidence is not yet conclusive, it is generally thought that the Biscayne and Turnpike Aquifers are interconnected. This situation may be disproven by the results of a more thorough study currently being conducted by the USGS.

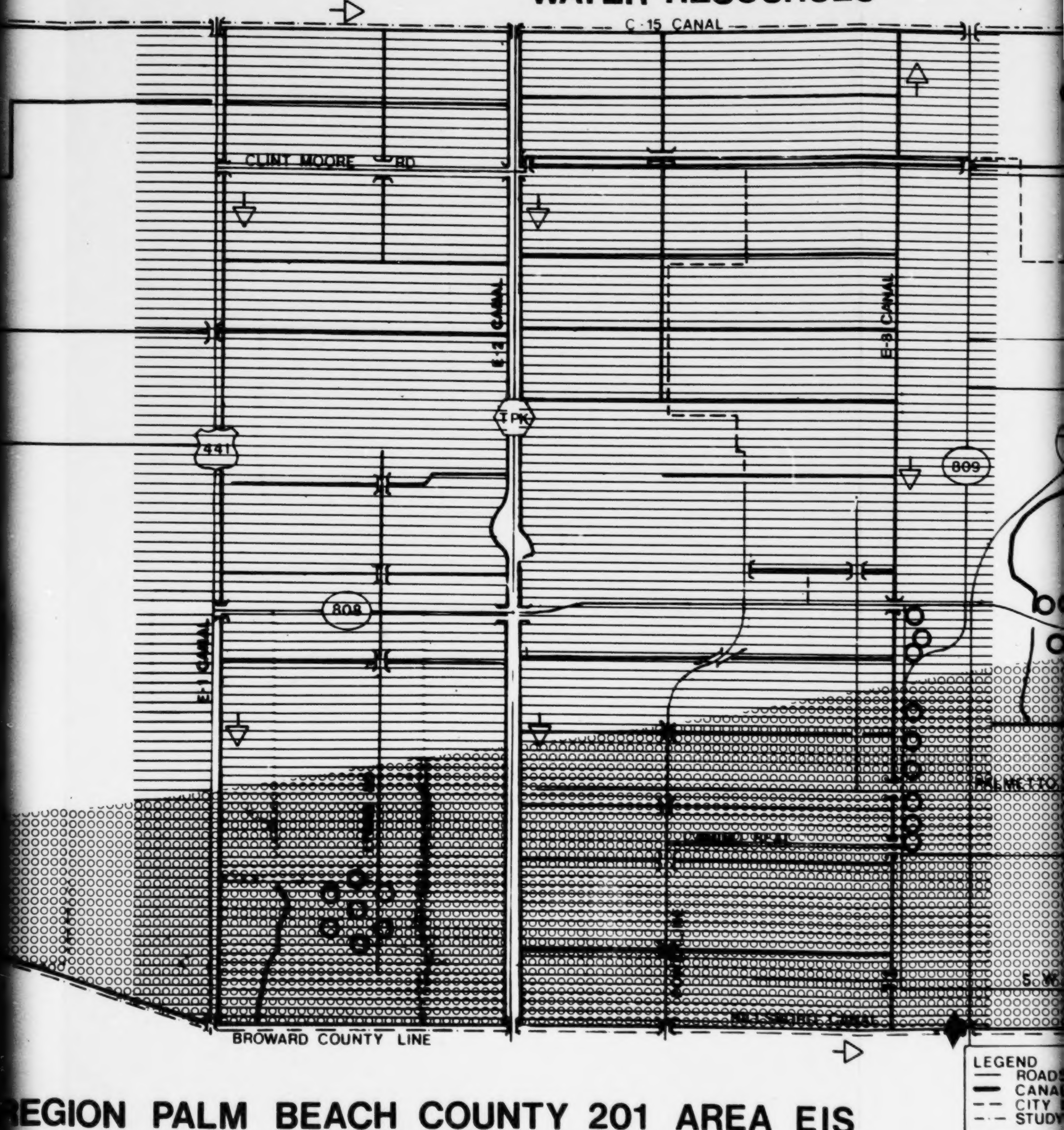
A study published in February 1976 stated that the Turnpike Aquifer supplies more than 90 percent of the potable water used in the eastern half of the County. The Aquifer ranges in depth from 125 feet below sea level near the Conservation Area to 250 feet below sea level along the coast. It is primarily recharged by local rainfall. The concentration of dissolved solids is generally less than the 500 mg/l State standard for drinking water. The bottom of the Aquifer ranges from 225 feet below sea level near the Conservation Area to 400 feet below sea level near the coast. The bottom of the Aquifer is formed by an impervious formation of green clay approximately 1500 feet thick. Below this formation is the highly salted Floridan Aquifer.


Legend
▭ major surface water bodies
— canals
◆ water control structures
○ existing wells
▨ biscayne aquifer
▤ shallow aquifer
—▷ flow direction
CLINT M
441
CONSERVATION AREA 1 LEVEE
E-1 CANAL
HILLSBORO CANAL
BROWAR

SOURCE: U.S.G.S., REPORT NO. 17, 1958
U.S.G.S., REPORT, WRI-76-21, 1976

SOUTHERN REGION PALM B

WATER RESOURCES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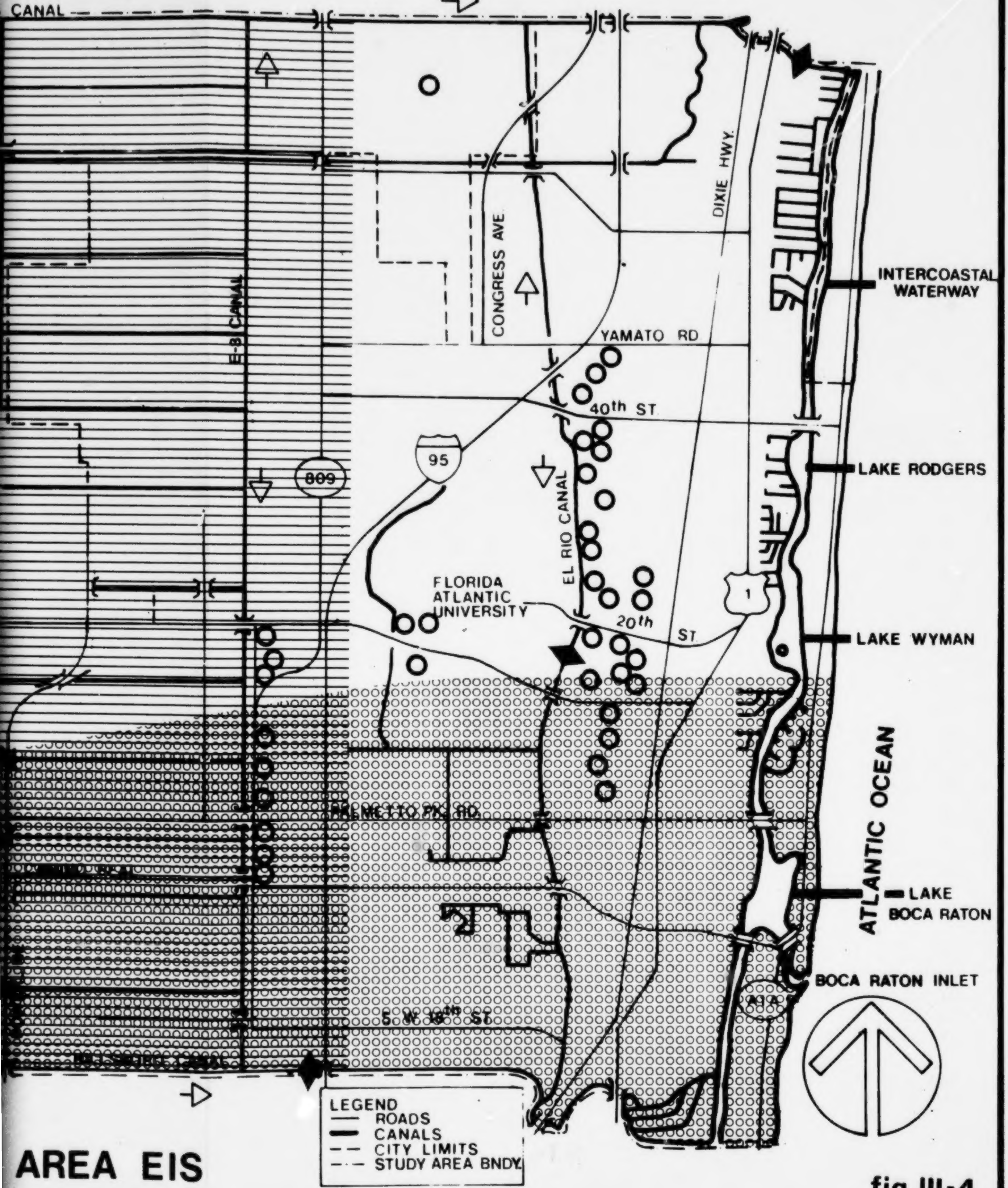
RESOURCES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S.W. 18th ST
HILLSBORO CANAL
A1A
INTERCOASTAL WATERWAY
LAKE RODGERS
LAKE WYMAN
LAKE BOCA RATON
BOCA RATON INLET
ATLANTIC OCEAN
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

AREA EIS

fig III-4

The EPA recently designated the Biscayne Aquifer and its tributaries as a "sole source aquifer" under provisions of the Safe Drinking Water Act. This designation means that all federally funded programs will be carefully examined to protect against possible contamination of this resource. The administrative rules to implement this designation are currently under preparation.

Control structures near the Intracoastal Waterway are used to regulate the release of canal water from the major canals during the dry season and to maintain the aquifer at the levels required to prevent saltwater intrusion. Consequently, during the dry season, zero flow is frequently recorded in many of the canals. These structures also function as flood control devices during wet conditions.

The mean discharge recorded in the Hillsboro Canal near Deerfield Beach is 332 cfs, based on 35 years of record. A flow of 3700 cfs in April 1979 and a minimum flow of 0.0 cfs was recorded for several days in 1939, 1940 and again in 1959. These flows, however, represent regulated, managed flows.

Flows in the other canals in the system are smaller than the Hillsboro Canal and their water levels and flows also reflect the water management operations as controlled by numerous control structures and pumping within the drainage district. Flow in these canals is minimal during the dry season. The seven-day, ten-year low flow (7/Q/10) for these canals is 0.0 cfs.

Water quality data for the canals indicate only marginal quality. Violations of the State water quality criteria are common as is the occurrence of nuisance aquatic plant growth.

The Hillsboro and C-15 Canals frequently violate the dissolved oxygen (D.O.) minimum criterion of 4 mg/l. In the Hillsboro Canal, violations of the D.O. standard occur more frequently during the wet season than in the dry season. This situation is a common occurrence in South Florida canals and is generally thought to be due more to groundwater influences.

While there were no firm numerical criteria established for nutrients, guidelines were suggested in the 208 Plan for nitrogen and phosphorus forms which are considered to be adequate for the control of nuisance growth. The Hillsboro Canal exceeds the recommended nutrient levels in both wet and dry seasons. Measurements taken at the Deerfield Lock showed a mean nitrogen concentration of 1.22 mg/l and a mean phosphorus concentration of 0.10 mg/l. These measurements compare to the 208 recommended guidelines of 1.0 mg/l of nitrogen and 0.07 mg/l of phosphorus (208 Plan, pg. 3.6-134).

Nutrient data for the urbanized areas of the Hillsboro Canal Basin show a steady increase in average concentration over time. The less urbanized areas show high, but relatively stable nutrient concentrations. Heavy metals and pesticides have been detected but are generally well below recommended levels for the major canals.

The quality of the secondary canals is of particular interest due to the proximity of municipal well fields. The City's two well fields are located in proximity to the E-3 and El Rio Canals. The wells are located near the canals since the canal system itself is the primary source of recharge during the dry season. Figure III-4 shows the approximate locations of these wells.

Since these canals are the immediate recharge of the drinking water aquifer, heavy metals and pesticides are also monitored by the U.S.G.S. On October 20, 1977, U.S.G.S. conducted a chemical analysis of water samples taken from the E-2 and E-3 Canals. The results of the analysis exceeded the water quality criteria for Class III waters. However, compared with the 1972 EPA raw drinking water quality recommendations, the following pollutants exceeded the recommended levels: detergents; toxaphene; 2,4-D; dielurin; phenoloc compounds and silvex.

Chemical analysis of raw water samples taken from two city test wells showed the same increasing trend for total lead even though concentrations were still below the allowable limits. Again, comparing the results with the EPA raw drinking water criteria, the following constituents were found to equal or exceed the recommended levels: iron, silvex and phenols. In addition, trace amounts of mercury and 2,4-D were detected.

Pesticides and herbicides are contributed through both urban and rural runoff. In addition, the use of herbicides to control aquatic weed growth is an additional source of these toxics. While the concentrations for most toxics do not exceed the recommended levels, a large variety has been detected in the surface waters, including some 16 pesticides, 2 herbicides, PCBs and mercury.

In 1972, EPA published a report which evaluated several alternative wastewater disposal methods in South Florida. Among the alternatives evaluated was disposal by outfall. This study found that this technique was a viable method of disposal provided that:

1. The outfall alignment minimized disturbance to the reefs.
2. The outfall extends beyond the third reef or at the 90 feet below sea level mark.
3. The effluent receives secondary treatment. Secondary treatment was defined as 100% removal of floatable and settleable solids; 90% removal of suspended solids; 90% removal of the BODs; and, chlorination of the effluent.

The City of Boca Raton prepares quarterly reports that monitor the effluent at the outfall. The City also makes visual inspection of the discharge area of the outfall on an annual basis. DER also requires monthly operating reports of the effluent at the plant. In addition, the Palm Beach County Health Department quarterly samples bacteriological conditions along the public beaches. None of these monitoring efforts have determined any adverse impacts from the outfall.

No adverse point source impacts to surface water quality will be caused by the implementation of any of the alternatives. The preferred alternative provides for continued discharge by the ocean outfall. As discussed above, no adverse impacts have been identified related to the operation of the ocean outfall. No discharges to surface waters other than the ocean are proposed in any of the alternatives.

An increase in non-point source runoff to surface waters will probably result from the increased population which will occur whichever alternative is implemented. The character of the runoff will change in the unincorporated area from being agricultural in nature to urban with more heavy metals resulting from the extended transportation system and a higher overall total runoff resulting from the increase in impervious surfaces.

Alternatives 2, 5 and 9 include discharge of treated wastewater by spray irrigation. This is a well proven technique with limited adverse impacts to groundwater anticipated. Alternative 8, the preferred alternative, involves the continued use of percolation ponds for discharge. Existing monitoring records indicate that no problems currently exist. A continued monitoring program will be in place to insure that no excessive nitrate build-up occurs in the future. Alternative 4 involves the use of deep well injection as a disposal technique. A test well would have to be tried before this alternative could be implemented.

The alternatives involving the use of the ocean outfall will dispose of up to 29 MGD of treated wastewater into the ocean. Alternatives 2, 4, 5, 8, and 9 involve some form of recycling of treated wastewater. Because of high land costs, all of these alternatives except for the continued use of the existing percolation ponds are not cost effective at this time. In the long term however, water supply problems may cause the re-evaluation of these alternatives in the entire southeast Florida area.

Potable Water

The City obtains its water from two wellfields. The east wellfield includes 25 wells, spaced from south to north along Northwest 2nd Avenue and El Rio Canal. Most of these wells have pumps rated at 1 MGD each (Wells 1 to 23). Wells 24 and 25 have pumps rated at 2 MGD each. Thus, the total capacity of the east wellfield is theoretically 27 MGD. Normally, the production is limited to 17 MGD, of which not more than 3 MGD is pumped from Wells 1 to 9, because of the potential for saltwater intrusion into this area.

The west wellfield included 10 wells, as of October 1978, each having a pump rated at 2 MGD, making the total capacity of 20 MGD. Wells 1 to 9 are spaced from north to south along the E-3 Canal, to the south of Glades Road. Well 10 is located at the Glades Road Water Plant. Two new wells, Nos. 11 and 12, are being constructed in the vicinity of the water treatment plant, each rated at 2 MGD. When the new wells are in operation, the total capacity of the west wellfield will theoretically be 24 MGD. However, normal production is expected to be limited by plant capacity to 20 MGD.

Accordingly, the combined capacity of the City's east and west wellfields at the beginning of 1979 was considered to be 37 MGD at the east wellfield and 20 MGD at the west wellfield. However, the existing treatment capacity of both plants is 33 MGD. The City's system serves virtually all of Boca Raton and a limited portion of the Reserve Area.

The South Palm Beach Utilities Company (SPBUC) serves all of the residences west of the Turnpike that are on a central system. The SPBUC estimates that there were 7,200 connections as of March 1979. The capacity of the system is 6.5 MGD. The existing flows in the area are 2.3 MGD. SPBUC's wellfields are in the Sandalfoot Golf Course.

The County operates a water and sewer system in the Pheasant Walk area. There are three wells tied to a reverse osmosis treatment plant with a capacity of 0.35 MGD. The plant is presently expanding to 1.08 MGD. Well No. 1 is a 100' deep, 6" well producing 0.24 MGD; well No. 2 is a 80' deep, 6" well producing 0.24 MGD and well No. 3 is a 10" well, 120' deep producing 0.48 MGD.

The increase in population expected in the Planning Area will cause a substantial increase in the demand for potable water. Future potable water needs in five year increments until the year 2000 are shown in Table III-8. All of these needs can be met by existing and proposed wellfields in the Planning Area to the year 2000.

Alternatives 2, 5, and 9 would decrease demand for potable water to some degree through the implementation of spray irrigation systems. These same alternatives, with the addition of alternatives 4 and 3, provide some degree of recycling. Alternatives 8 and 10 will not provide Federal funding to service this expanded demand.

TABLE III-8
PROJECTED WATER DEMAND
(MGD)

Year	Demand	East of Turnpike	West of Turnpike	Total Study Area
1980	Average Daily Demand	17.9	2.3	20.2
1980	Maximum Daily Demand	29.5	3.8	33.3
1980	Production Required	33.0	4.2	37.2
1985	Average Daily Demand	26.4	4.1	30.5
1985	Maximum Daily Demand	43.6	6.8	50.4
1985	Production Required	48.8	7.6	56.5
1990	Average Daily Demand	37.9	7.8	45.7
1990	Maximum Daily Demand	62.5	12.9	75.4
1990	Production Required	70.0	14.4	84.4
1995	Average Daily Demand	45.9	10.9	56.8
1995	Maximum Daily Demand	75.7	18.0	93.0
1995	Production Required	84.8	20.2	105.0
2000	Average Daily Demand	54.4	13.6	68.0
2000	Maximum Daily Demand	89.8	22.4	112.2
2000	Production Required	100.6	25.1	125.7

Source: Baseline Environment Report, Jaunary 1980

Cultural Resources

The Spanish explorers probably stayed in the Boca Raton area as early as the late 1500s. For the next two or three centuries, pirates used Lake Boca Raton as a camp or hiding place during their escapades in the area. The Seminole Indians settled in the area in the early 1800's, and the first permanent resident was probably Joshua Bowen, in the late 1870's.

The Boca Raton area did not develop until Henry Flagler extended the railroad (now known as the Florida East Coast Railroad) to Miami in the late 1890's. Around the turn of the century, T.M. Richards began selling land for growing pineapples. The area prospered as a winter vegetable region through the early 1900's.

The Florida Division of Archives, History and Records Management indicates that the last two surveys conducted in the area were completed in 1955 and 1980 with the cooperation of the Historical Preservation Board of Boca Raton. Both surveys concentrated in the eastern portion of the Planning Area.

All of the archeological sites listed have been excavated or disturbed. The Barnhill Mound site at U.S. 1 and Yamato Road is included within the site of a proposed subdivision. Since the western area has been disturbed by agricultural operations, it is doubtful that any historical or archeological sites of significance remain.

There are no definite local government programs or regulations to protect historical or archeological resources. However, both the City and County are in the process of developing such programs. A proposal to designate Floresta as a historic district is under consideration by the City.

Construction activities associated with wastewater treatment facilities and with projected growth and development may destroy historical and archaeological resources unless appropriate precautions are taken. Any direct impacts from the construction of facilities associated with any of these alternatives should be minimal since almost all of the construction proposed will be on already disturbed rights-of-way. Appropriate consultation has been undertaken with the Florida State Historic Preservation Officer. A copy of the State's letter to us is presented in Chapter VI.

Recreational Resources

The major existing and proposed outdoor recreation facilities are listed in Table III-9. Indoor recreation is provided at the Boca Raton Community Center, the Community Center/Clubhouses in most of the large land development projects, and at many of the schools.

An analysis of the planned unit development (PUD) throughout the Planning Area shows that an abundance of both indoor and outdoor recreation opportunities have been supplied by the private sector. These developments typically provide one or more golf courses, tennis courts, swimming pools, bicycle paths, and a wide variety of indoor facilities.

Both the City and the County require open space to be provided within PUDs. These requirements are 40 percent and 35 percent, respectively. Subdivisions are also required to provide recreational facilities. It is difficult to determine the exact amount of recreational facilities that have been provided through these mechanisms because not all open space is usable for recreation.

The large projected increase in population will require additional recreational facilities to avoid overcrowding of existing facilities as shown in Table III-3. The impacts to these facilities will not be as severe as to others such as schools and transportation since the existing recreational facilities are largely adequate. Also, open space is being provided in the new PUD developments in the Planning Area.

Transportation

The predominant transportation characteristic of the area is its north-south orientation. The major highways (U.S. 441, the Florida Turnpike, I-95, U.S. 1 and SR AIA), the Intracoastal Waterway and the two railroads follow this pattern. There is no single roadway that completely traverses the area in an east-west direction.

Initially, these facilities allowed travelers to pass through the area with Miami-Ft. Lauderdale as their destination. As that area developed, these facilities have acted as funnels for the northward expansion of urban development. The completion of I-95 northward through the area resulted in further acceleration of this trend. It provides easy access to the major employment centers outside the 201 planning area.

TABLE III-9

OUTDOOR RECREATION FACILITIES

Facility Name	Size (acres)	Ownership
Boca Island	1.5	Boca Raton
Por-la-Mor Park	0.5	Boca Raton
Hughes Park	5.0	Boca Raton
Meadows Park	12.0	Boca Raton
Sanbourn Square	0.5	Boca Raton
Silver Palm Park	2.0	Boca Raton
University Woodlands Park	15.0	Boca Raton
Silver Palm Park	2.0	Boca Raton
Memorial Park	18.0	Boca Raton
Unnamed (W. Palmetto Park Road)	13.0	Unknown
South Beach Park	98.0	Boca Raton
Spanish River Park	79.0	Boca Raton
Lake Wyman Tract	60.0	Boca Raton
Harrison Tract	187.0	Boca Raton
Schine Tract	67.0	Boca Raton
South Inlet Park	11.0	Palm Beach County
Boca Raton Country Club	56.0	Private
Boca Raton Hotel & Club	121.0	Private
Boca Teeca Golf Club	210.0	Private
Royal Palm Yacht & Country Club	145.0	Private
Boca Raton Municipal Golf Course	13.0	Boca Raton
Broken Sound Golf Club	N/A	Private
Southern Manor Golf Course	N/A	Private
Hillsboro Country Club	N/A	Private
Sandalfoot Country Club	N/A	Private
Boca West Facility	N/A	Private
Boca Del Mar Facility	N/A	Private
Mitchell School - Joint Use	20.0	Palm Beach County
Boca Raton High School	20.0	Palm Beach County
Boca Middle School	20.0	Palm Beach County
Addison Mizner School	15.0	Palm Beach County
Boca Elementary School	6.8	Palm Beach County

Sources: Recreation/Open Space Planning - A Guide For Local Government; Area Planning Board of Palm Beach County, June 1978.

Boca Raton Comprehensive Plan, April 1979

SR 808 (Glades Road) remains the only access point to the Turnpike within the study area. This highway provides the only continuous east-west access between U.S. 441 and U.S. 1. Its recent widening east of the Turnpike was completed in response to its importance as an east-west access route.

There will likely be disruption of traffic during construction of the force mains. All of the force mains will be built within the right-of-ways of major roads. Therefore, surrounding land uses will not be directly affected by the construction.

The construction of the regional force main from U.S. 441 along Glades Road to the treatment plant will likely cause the most traffic disruption of all the force main construction activities since the right-of-way under the Turnpike is extremely narrow. There are plans to four-lane this section of Glades Road in the near future. This section of the roadway will undergo sever distruption during the widening. Therefore, it would be prudent to construct the force main at the same time the road is widened.

A large increase in area traffic is projected based upon the expected increase in population. The anticipated impact of this increase on the projected number of trips is shown in Table III-3. This increase in number of trips will result in more congested driving conditions on all major highways in the area unless significant improvement are made to the area's highway system.

Resource Use

Electric power for all of the southeast Florida area is supplied by the Florida Power and Light Company (FPL). FPL facilities are part of a cooperative statewide power supply interconnection system. Natural gas is supplied to the area by a pipeline from Texas.

There will be sufficient lead time to plan for new facilities should it become necessary in the future. The Florida Power Plant Siting Act (Chap. 403, Part II) requires all electric power companies to prepare a 10-year master plan for new facility needs. These are annually updated in April.

Table III-10 depicts the projected power consumption throughout the study period. The estimates were determined by utilizing data contained within the Ten Year Power Plant Site Plan 1978-87 submitted by FPL in April 1978.

TABLE III-10

PROJECTED ELECTRIC POWER CONSUMPTION

(millions of KWH)

Year	Residential	Commercial	Industrial	Total	Percent Increase
1978	251.90	168.00	7.30	427.30	N/Ap
1980	292.90	195.00	8.46	496.40	14
1985	440.50	294.00	12.80	747.30	34
1990	671.20	447.00	19.40	1137.60	34
1995	842.50	561.00	24.40	1427.40	20
2000	990.60	660.00	28.70	1679.30	15

Source: Stottler Stagg & Associates Estimates, June 1979.

Air Quality

The Southern Region Palm Beach County 201 Area is located in Air Quality Control Region (AQCR) 50 which includes Dade, Broward, and Palm Beach Counties. The Palm Beach County Health Department, Air Pollution Section, administers the air quality of Palm Beach County through a series of monitoring stations, three of which are located in Boca Raton. The parameters monitored in the Planning Area are total suspended particulates, benzene soluable organics, sulfates, nitrates, nitrogen dioxide, sulfur dioxide, total oxidants, and hydrocarbons. Table III-11 presents specific air quality data collected in Boca Raton during 1977. The primary source of air pollution in the Planning Area is the motor vehicle. No heavy industry is present.

The future air quality of the Planning Area will be similar whichever alternative is selected for treatment and disposal. This is due to the fact that air quality degradation in this area is basically a product of the increased traffic conditions being generated by the the population increase. The year 2000 population projections are expected to be similar under all of the alternatives, including no Federal action. The high levels of projected population increase will cause a decrease in air quality conditions. However, no significant problems are expected. Favorable wind conditions in the area will likely keep air quality conditions within acceptable ranges.

Noise

There is no comprehensive noise monitoring program in the area. The City of Boca Raton does, however, have a noise control ordinance. The most prominent noise generators in the area largely involve transportation facilities. These include the Boca Raton Airport, the Railroad Corridor, Federal Highway, I-95, Florida's Turnpike, Glades Road, and Palmetto Park Road.

The Planning Area has relatively low ambient noise levels. Short-term noise impacts can be expected with pipeline and facility construction and are caused by movement of heavy equipment, possibly blasting and ditch digging. Facility operation and maintenance noise includes operation of mechanical aerators and some increase in vehicular traffic. No significant noise problems have been identified at the existing facilities and none are expected in the future as a result of this project.

TABLE III-11
AIR QUALITY OF THE SOUTHERN REGION PALM BEACH COUNTY 201 AREA
(Boca Raton, Florida)

	Suspended Particulates Arithmetic Average ug/m^3							
Monitoring Station Location	Total	Organics Benzene Soluable	Sulfates	Nitrates	Sulfur Dioxide ppm[a]	Nitrogen Dioxide ppm[b]	Total Oxidants ppm[c]	Hydro-carbons ppm[d]
Boca Raton Fire Station #1	39.3	1.79	5.52	1.56	0.010	0.024	0.032	4.2
College of Boca Raton	29.8	1.76	5.52	1.36	ND[e]	ND	ND	ND
Florida Atlantic University	ND	ND	ND	ND	ND	0.006	ND	ND

Source: Palm Beach County Health Department, Division of Environmental Science and Engineering, Air Pollution Control. [1978?] Annual Report, 1977. Palm Beach, Florida. 77 pp.

[a] Mean of 24-hour maximums taken at intermittent periods during the year.

[b] Mean of arithmetic means taken at intermittent periods during the year.

[c] Mean of 8-hour maximums taken at intermittent periods during the year.

[d] Maximum ambient concentration over an 8-hour period.

[e] No data, parameter not monitored at this station.

Odors

The Southern Region Palm Beach County 201 Area has no heavy industry and very little light industry which produce odors. In general, the land use plan for Boca Raton separates industrial areas from residential areas. Odor has not historically been a significant problem.

This Planning Area has had very few odor problems in the past from any sources. It is not expected that any of these wastewater management alternatives will lead to any significant problems in the future. The alternatives with two and three treatment plants will have a slightly greater chance of operation and maintenance problems leading to odor episodes. Any odors related to sludge management will be addressed in the Final EIS.

Topography and Geology

The Southern Region Palm Beach County 201 Area lies within three physiographic provinces of south Florida-Coastal Ridge, Sandy Flatlands, and Everglades. The area is quite flat with elevations seldom exceeding 25 feet. The highest elevations occur on the Coastal Ridge which slopes downward towards the flat western portion of the Planning Area.

The region has no major streams or rivers as the drainage pattern south of Lake Okeechobee has historically been by sheet flow through the Everglades. However, developmental pressure by man has required that the water level be managed by a network of canals to maintain water level during dry periods and facilitate drainage of excess water during wet periods.

The South Florida Water Management District and the Lake Worth Drainage District have responsibility for the extensive canal network in the Planning Area. The primary canals are the C-15 and Hillsboro Canals which flow into the Atlantic Ocean. Several second-order canals, oriented in a north-south direction, flow into the C-15 and Hillsboro, and numerous smaller canals and ditches extend perpendicularly to the system described above. At present, the canal system is very extensive and no new water management facilities are planned except to update or replace existing structures.

The Florida Peninsula is the exposed ridge portion of a broad extension from the North American continent. It consists of a mantle of marine sediments (approximately 15,000 feet thick in the study area) overlying a core of metamorphic and igneous rocks. The different marine sediments are significant not only as exposed surface material, but also because their differential permeabilities are responsible for the aquifers which provide most of South Florida with its water supplies. The geology will therefore be discussed in some detail.

The shallow non-artesian Biscayne Aquifer, from which the City of Boca Raton currently draws its water supplies, includes the Pamlico Sand, Anastasia Formation, Miami Oolite, Fort Thompson Formation, and Caloosahatchee Marl. The relatively impervious Tamiami Formation and Upper portions of the Hawthorn Formation form an aquiclude beneath the Aquifer.

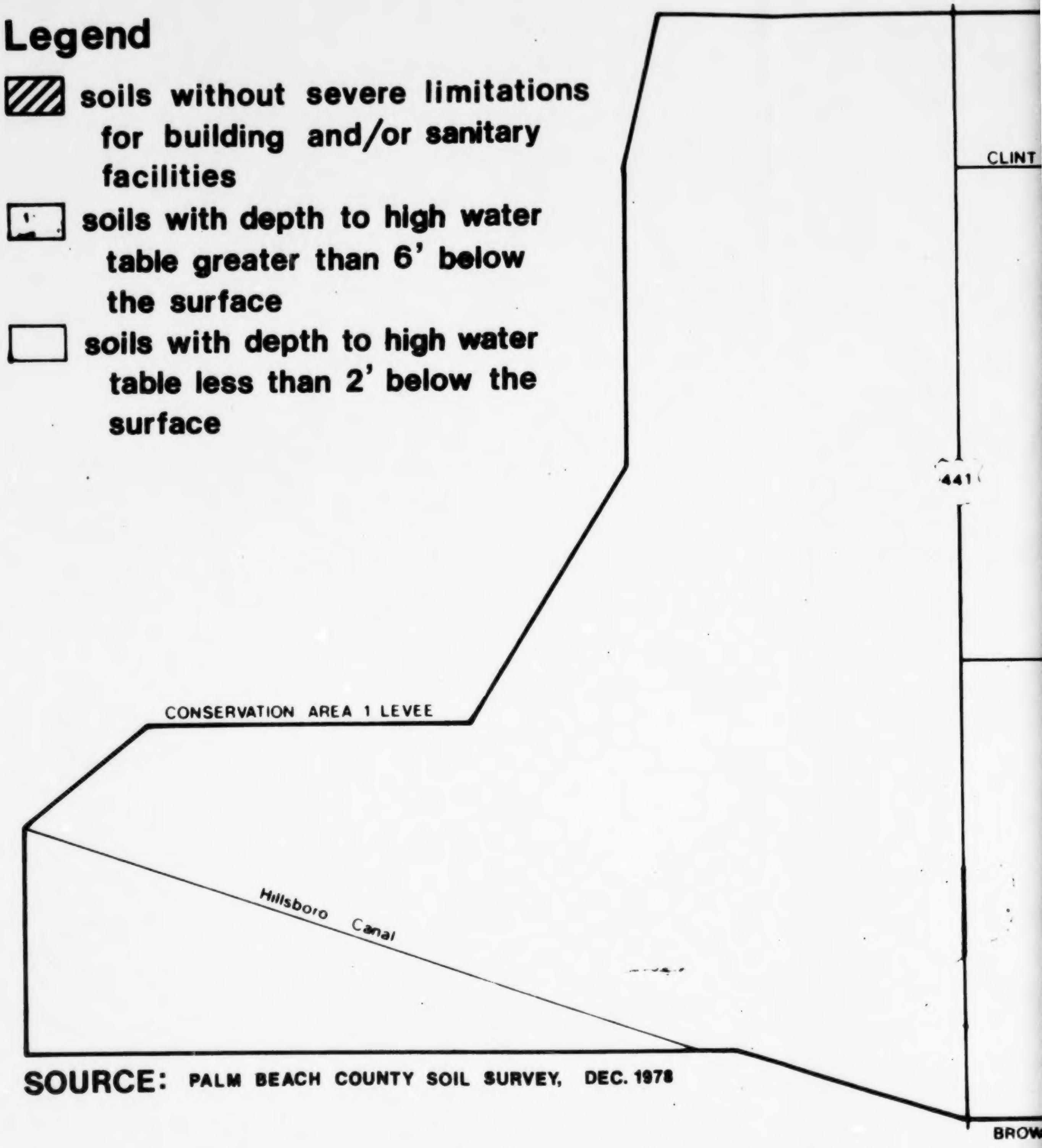
The surface geology of the Southern Region Palm Beach 201 area is uncomplicated: only two formations are present. Miami Oolite occurs in the south and west of the Planning Area; in the northeast it intergrades into the Anastasia Formation. Both are generally covered by either Pleistocene Pamlico Sand (on the coastal ridge) or organic soils (in the low-lying areas to the west), so actual outcrops are very rare.

Geology imposes no constraints on or difficulties in construction within the Planning Area. Soils, features closely related to and derivative from the geology, however, do require careful consideration and planning for construction.

No significant impacts are expected from any of the alternatives to the geology or topography of the Planning Area.

Soils

The Soil Conservation Service (SCS) published the Soil Survey for Palm Beach County in December 1978. Figure III-5 summarizes these limitations in graphic form. It also shows the depth of the seasonal high water table. For graphic simplicity's sake, this latter limitation is shown for only those soils west of I-95.



Legend

▨ soils without severe limitations for building and/or sanitary facilities

⬚ soils with depth to high water table greater than 6' below the surface

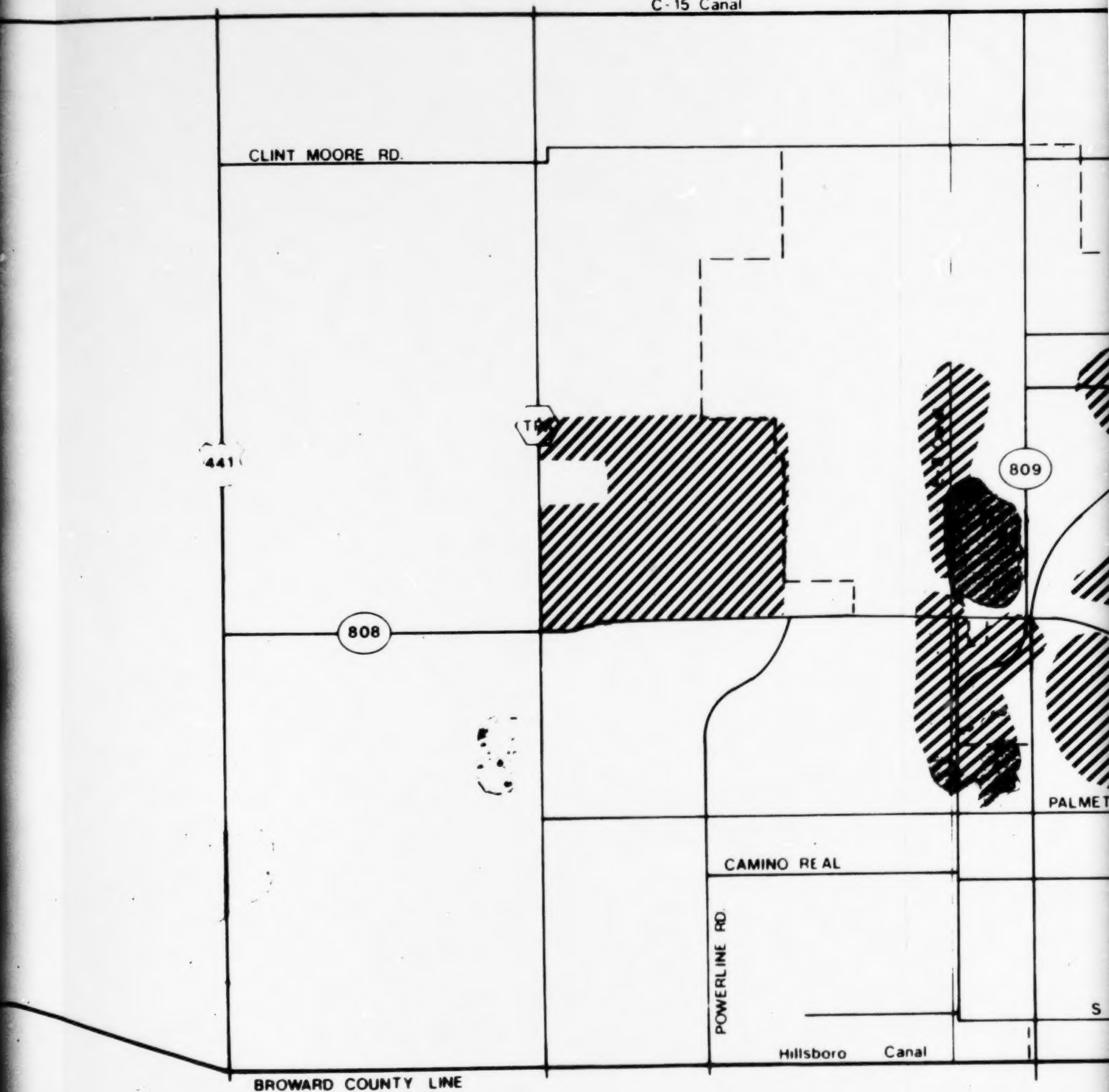
☐ soils with depth to high water table less than 2' below the surface

CLINT
441
CONSERVATION AREA 1 LEVEE
Hillsboro Canal
BROW

SOURCE: PALM BEACH COUNTY SOIL SURVEY, DEC. 1978

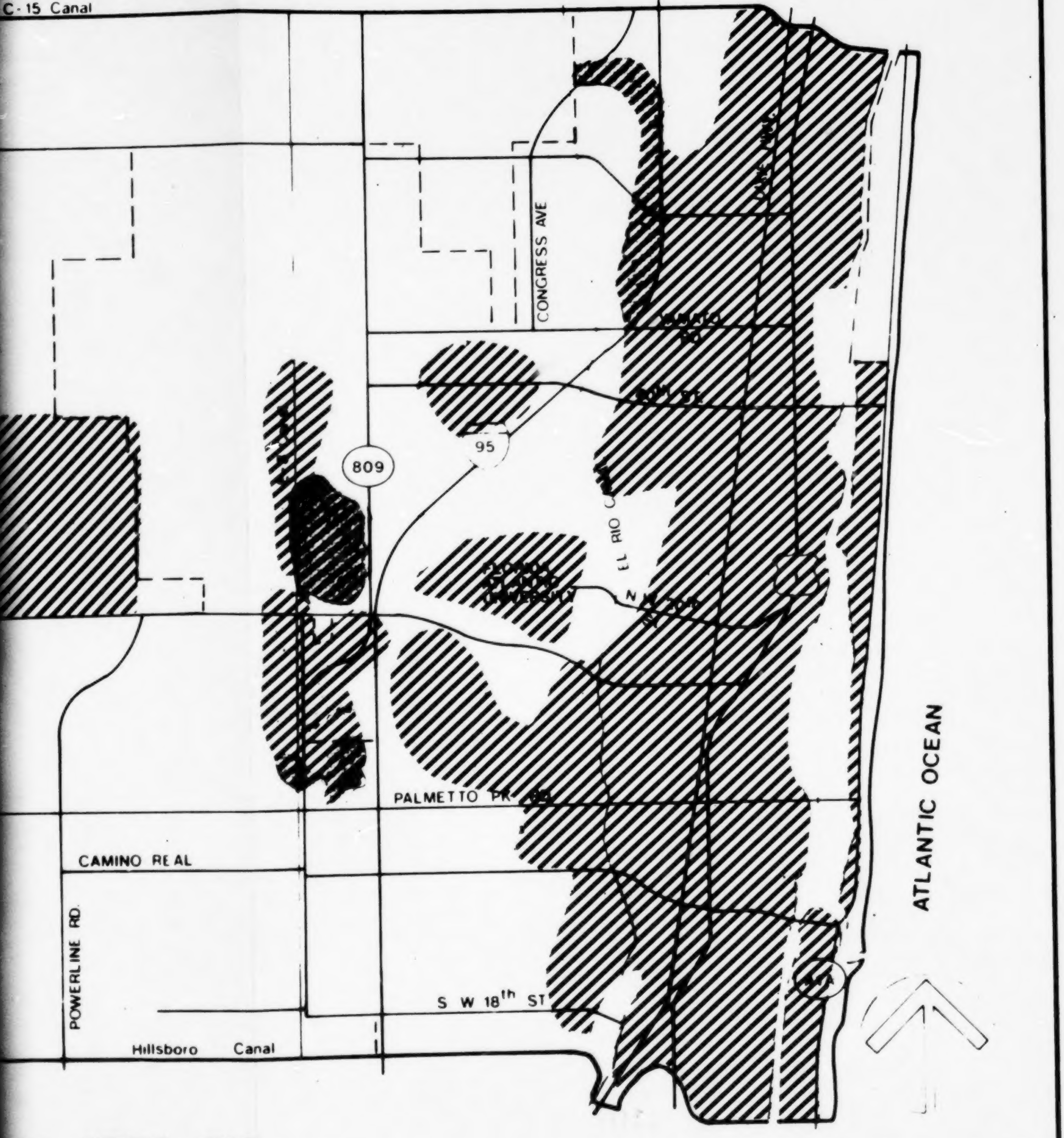
SOUTHERN REGION PALM

CHARACTERISTICS OF SOILS


C-15 Canal
CLINT MOORE RD.
441
TPK
809
808
PALMET
CAMINO REAL
POWERLINE RD.
S
Hillsboro Canal
BROWARD COUNTY LINE

REGION PALM BEACH COUNTY 201 AREA EIS

RISTICS OF SOILS


C-15 Canal
CONGRESS AVE
809
95
EL RIO C
PALMETTO PK RD
CAMINO REAL
POWERLINE RD.
S W 18th ST
Hillsboro Canal
ATLANTIC OCEAN

201 AREA EIS

fig III-5

The term slight limitation means that the soil properties and features are generally favorable for that use and that the limitations that are present are minor and can be easily overcome. The term moderate limitation means that the soil properties and features are generally unfavorable for that use, but can be overcome or minimized by special design and planning. The term severe means that the soil properities and features are generally so unfavorable and difficult to correct or overcome that major soil reclamation, special design or intensive maintenance is required.

The Soil Survey also states that "in many of the soils that have moderate or severe limitations for use as septic tank absorption fields, it may be possible to install a special system to lower the seasonal water table or to increase the size of the absorption field so that performance is satisfactory" (pg. 76). This report also states that "imprevious soil that is at least 4 feet thick is required for the lagoon floor and sides to minimize seepage and contamination of local groundwater. Soils that are very high in organic matter content and have stones and boulders are undesirable. Unless the soil has very slow permeability, contamination of local groundwater is a hazard in areas where the seasonal high water table is above the level of the lagoon floor. If the water table is seasonally high, seepage of groundwater into the lagoon can seriously reduce the capacity for liquid waste" (pg. 76).

A seasonal high water table is the highest level of a saturated zone more than 6 inches thick held in soils for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils at the site in question. Therefore, Figure III-5 shows that, with the exception of a few areas, all of the soils west of I-95 have a depth of less than 6 feet to the seasonal highwater table. In fact, virtually all of the soils west of I-95 have a depth of less than 2 feet to the seasonal high water table.

The months of the year that the high water is commonly present is also an important limitation. The soils shown as having a depth to the water table of less than 6 feet generally have high water conditions from June through November and often through February. Therefore, the soils in these areas experience high water conditions six or more months out of the year.

The reader should be cautioned to remember that the Soil Survey is generalized over the entire Planning Area. The results of that document are further generalized for purposes of this study.

The County Comprehensive Plan projects service by septic tanks in subbasins F and I of the Planning Area. Proper testing by the Palm Beach County Health Department and proper maintenance procedures by the customers should preclude any significant adverse impacts.

Vegetation

The vegetation of Boca Raton is highly diverse in number of species and biotic communities. Such diversity is directly correlated with diversity of abiotic environmental features: topographic, geologic, pedologic, hydrologic, climatic, and physiographic. Although the warm, humid subtropical climate is generally favorable for plant growth, local topographically-determined variations in hydrology and pedology provide very different environments. Moisture availability varies from extremely hydric (wet) to extremely xeric (dry), salinity from highly saline to fresh, and soils from very organic (peat) to very mineral (white sand). Variations in these and other environmental factors create a diversity of habitats to which various plant species and associations are adapted. Distribution of faunal species in the area is in turn determined by shelter, food, and nesting resources provided by the plant associations. These interdependent associations of biota are termed biotic communities.

Thus, a biotic community represents a significantly different and recognizable combination of abiotic features (climate, geology, pedology, hydrology, topography, and physiography) and biotic features (flora and fauna) which have a strong correlation among themselves and a much lesser connection with features of adjoining areas. Biotic community boundaries are rarely sharp, and relatively arbitrary decisions are sometimes necessary where a continuum exists between two different associations.

It should be stressed that environments and biotic communitities are dynamic; natural events, such as tidal inundation, storm flooding, sediment deposition, and fire, strongly influence the abiotic and biotic elements of the biotic community. Disturbances related to man, such as development, drainage, sewage, water draw-down, fire, introduced species, and agriculture, also have profound effects on biotic communities. All of these factors, considered through time, will produce successional change in community distribution and condition.

Successional patterns are complicated in the Planning Area by a variety of natural and man-induced factors: fire, hurricanes, droughts, drainage, lowering of the water table, mechanical disturbance, and aggressive introduced species. Coastal Hammock and Low Hammock would appear to be the "true" climaxes in upland situations in the absence of fire. However, fire is naturally so frequent in this habitat that "true" climaxes are much more the exception than the rule. More frequently, the successional trend toward this arborescent community is halted permanently or semi-permanently by periodic fire, and scrub, dry prairie, or pine flatwood communities persist. These communities may be termed topo-edaphic climaxes, and are just as important and natural a part of the vegetation as the "true" climax.

Natural conditions in southern Florida are extremely dynamic; the geological youth of the area, sea level variations, periodic drought, fire, and catastrophic events such as hurricanes have created continuously shifting vegetation patterns in the area. Since man's influx into the area in the 20th century, environmental change has been vastly accelerated, to the point where even those areas which have not been directly affected by construction and disturbance have been strongly modified by watertable draw-down (resulting in a greater frequency of fire), ditching and drainage, and aggressive invasion by various introduced species. Development and other less direct disturbances of the natural environment are currently taking place at such a rate that few first-rate examples of the native vegetation remain in the Planning Area.

The vegetation map Figure III-6 is based on the Boca Raton Comprehensive Plan, and limited field reconnaissance and verification by Coastal Zone Resources biologists. Since much of the existing information is several years old and development is occurring at a very rapid rate, many of the areas shown as native vegetation may at this time or at some time in the near future be changed to "Urban Disturbed Built-Up". Much of the agricultural land in the western half of the Planning Area is already committed for residential development. Some portions of the map are already out of date; others will undoubtedly become so in the next few years.

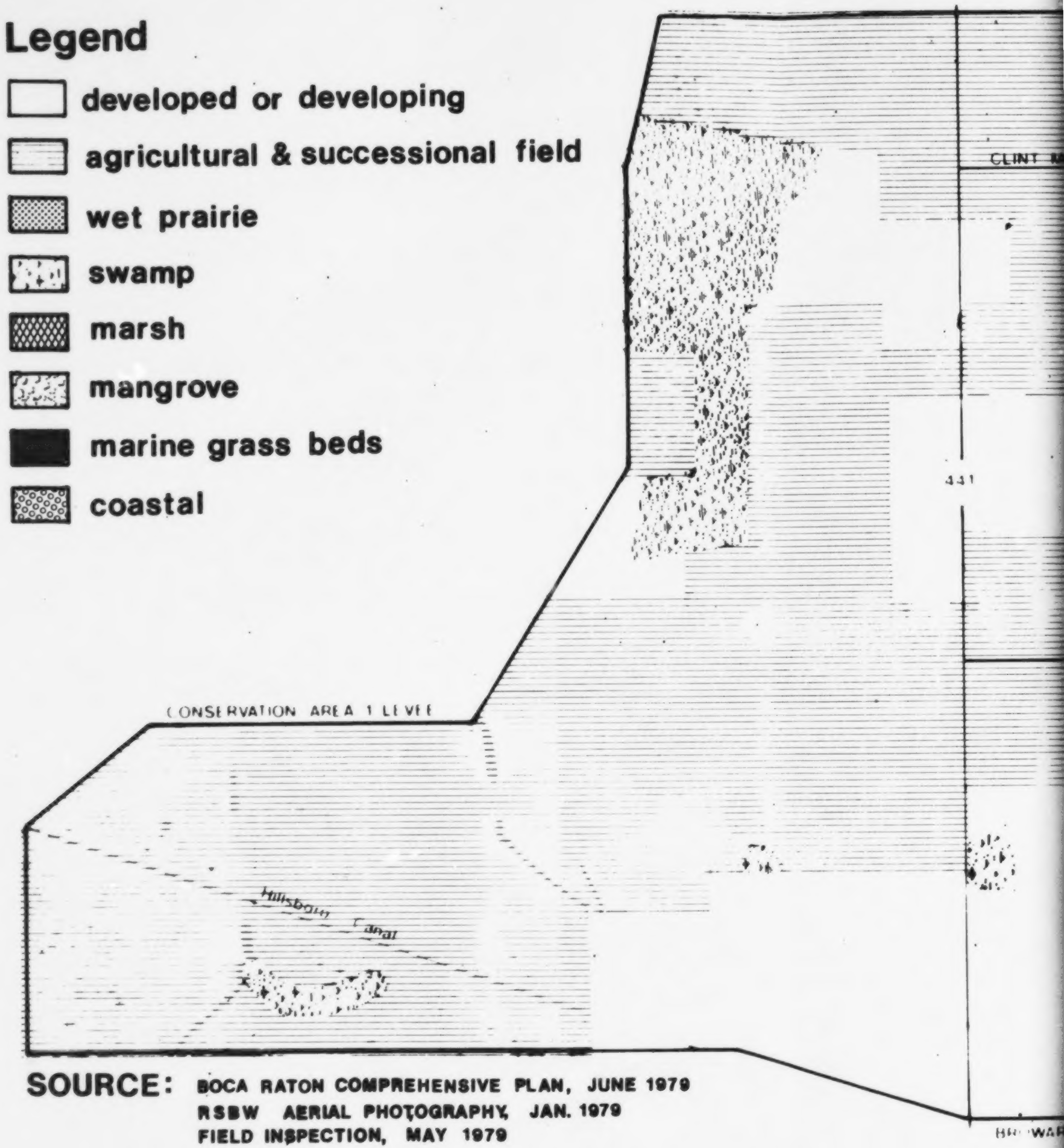
Ideally, most relatively intact and undisturbed areas of native vegetation should be protected from further development for a variety of reasons:

1. They provide valuable recreational and open-space land in an increasingly urbanized area.
2. They provide valuable wildlife habitat.
3. They provide habitat for a relatively large number of rare, endangered, endemic, and unique animal and plant species, found nowhere else in the United States.
4. They have high scientific and educational value.
5. They have been reduced to a small fraction of their extent prior to this century.
6. Wetlands reduce contaminant loading, aid in nutrient cycling, protect other areas from erosion and flooding damage, and have a high biological productivity.
7. Uplands are critical for aquifer recharge and reduction of storm run-off.

The projected population and land use changes discussed earlier in this chapter will significantly decrease the amount of undeveloped land in the Planning Area. This will lower the diversity and amount of vegetative species. No appreciable difference is expected among the alternatives with respect to this impact.

Wildlife

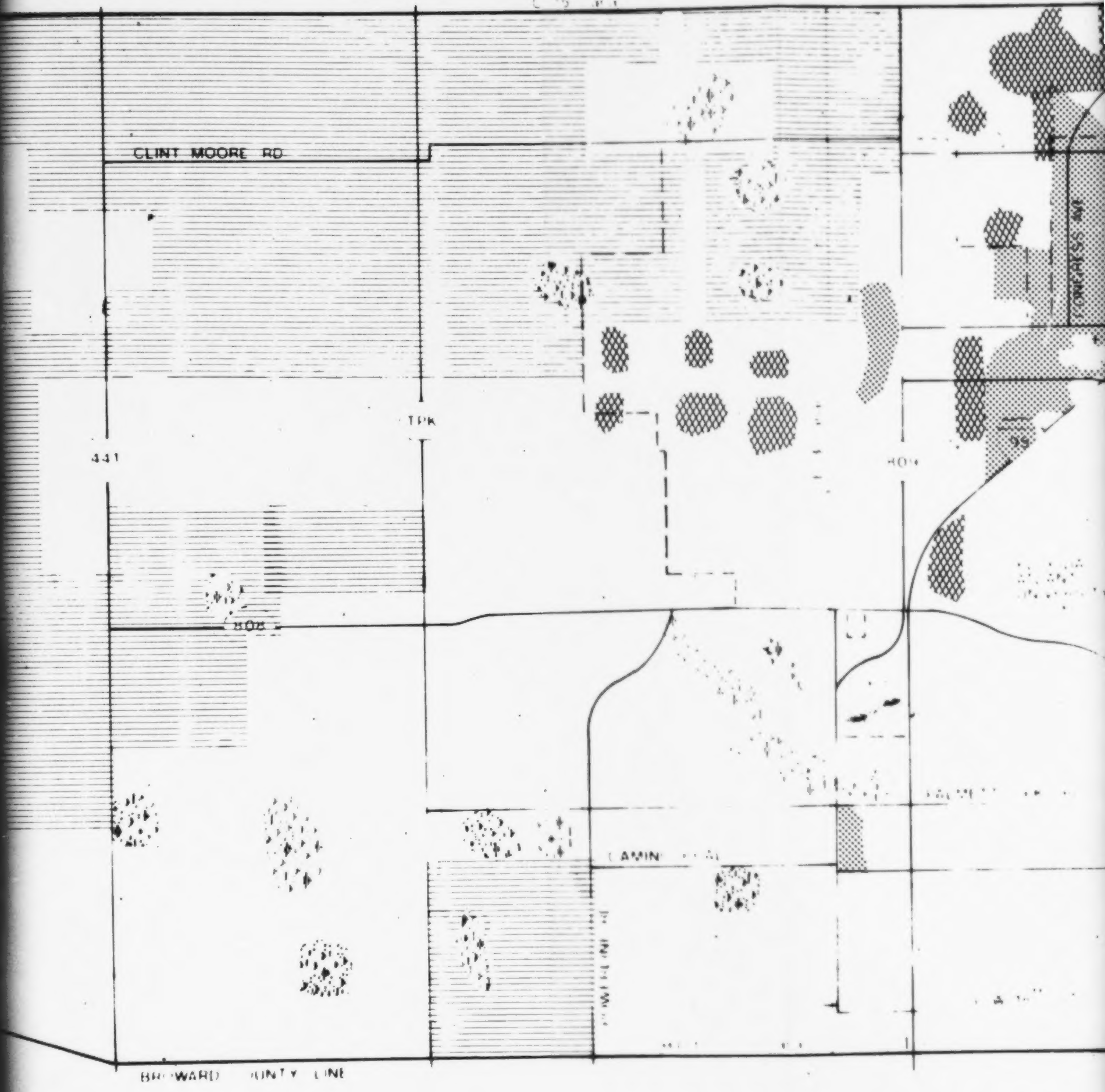
The Planning Area has a wide range of wildlife habitats including urban, scrub, swamps, freshwater canals and ponds, and estuarine waters of the AIWW and adjacent finger canals. The ranges of certain animals are restricted by very specific habitat requirements, but many species, especilly birds and mammals, are highly mobile and may utilize several of the plant communities regularly. Appendix C characterizes the animal species found in the Planning Area.


Legend
developed or developing
agricultural & successional field
wet prairie
swamp
marsh
mangrove
marine grass beds
coastal
CLINT M
441
CONSERVATION AREA 1 LEVEE
Hillsboro Canal
BROWAR

SOURCE: BOCA RATON COMPREHENSIVE PLAN, JUNE 1979
RSBW AERIAL PHOTOGRAPHY, JAN. 1979
FIELD INSPECTION, MAY 1979

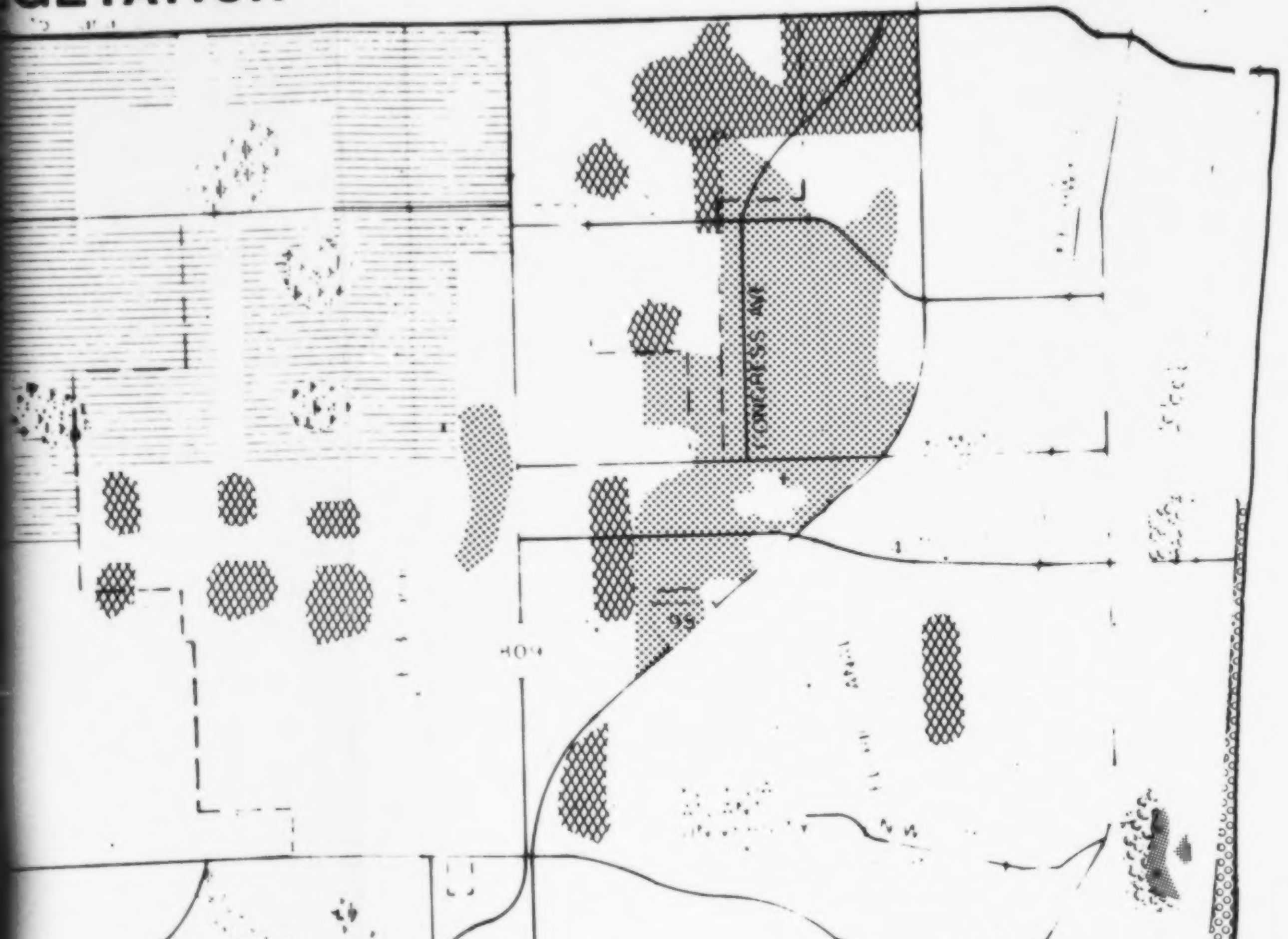
SOUTHERN REGION PALM B

VEGETATION


CLINT MOORE RD
441
TPK
808
809
CONGRESS AVE
95
CAMINO REAL
BROWARD COUNTY LINE

N PALM BEACH COUNTY 201 AREA EIS

GETATION


CONGRESS AVE
95
ATLANTIC OCEAN

201 AREA EIS

fig III-6

No primary impacts are expected to occur as a result of this project, since most possible construction areas have already been disturbed. The decrease in vegetative habitat discussed above will lead to a concurrent decrease in the wildlife present in the project area.

Sensitive Areas

The section regarding sensitive areas is intended to identify those areas or sites which will require special attention during the impact analysis phase. Such areas include the beach; the habitat of the manatee; the archeological, historical and recreational sites noted previously; water recharge areas; the buffer zone along the Conservation Area; floodprone sites; scattered wetland areas; and the winter vegetable croplands. Most of these areas are shown in Figure III-7.

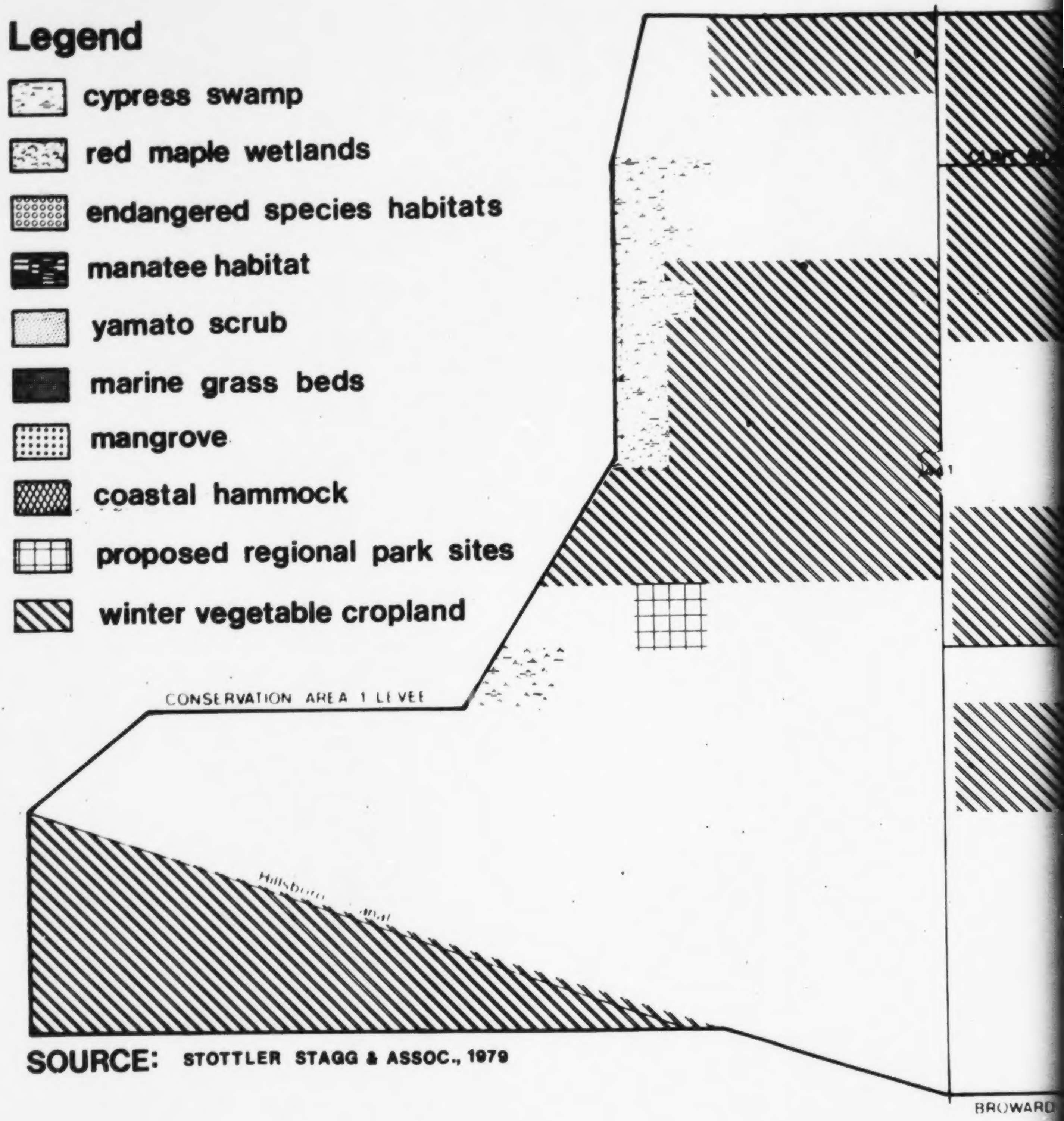
As mentioned, the manatee regularly inhabits the Intracoastal Waterway, particularly during the winter months. Sea turtles nest during the late spring and early summer along the Boca Raton beaches. The marine grass beds in Lake Wyman and Lake Boca Raton have been identified as significant natural resources.

Mangrove communities exist in the Lake Wyman area and the 40th Street-Intracoastal Waterway area. Other significant vegetative communities are found in the marsh area around the confluence of the El Rio Canal and the C-15 Canal, as well as along the Conservation Area levee.

The Schine tract and the Lake Wyman tract represent important areas that contain a variety of threatened and endangered species. The proposed regional park sites at Boca Teeca, Patch Reef and west of U.S. 441 are potential recreation resources.

Most of the archeological sites have been disturbed on one or more occasions. The historic areas represent sites worthy of nomination to the National Register of Historical Places. A more complete description of the threatened and endangered species and their habitats is found in the wildlife section of this chapter.

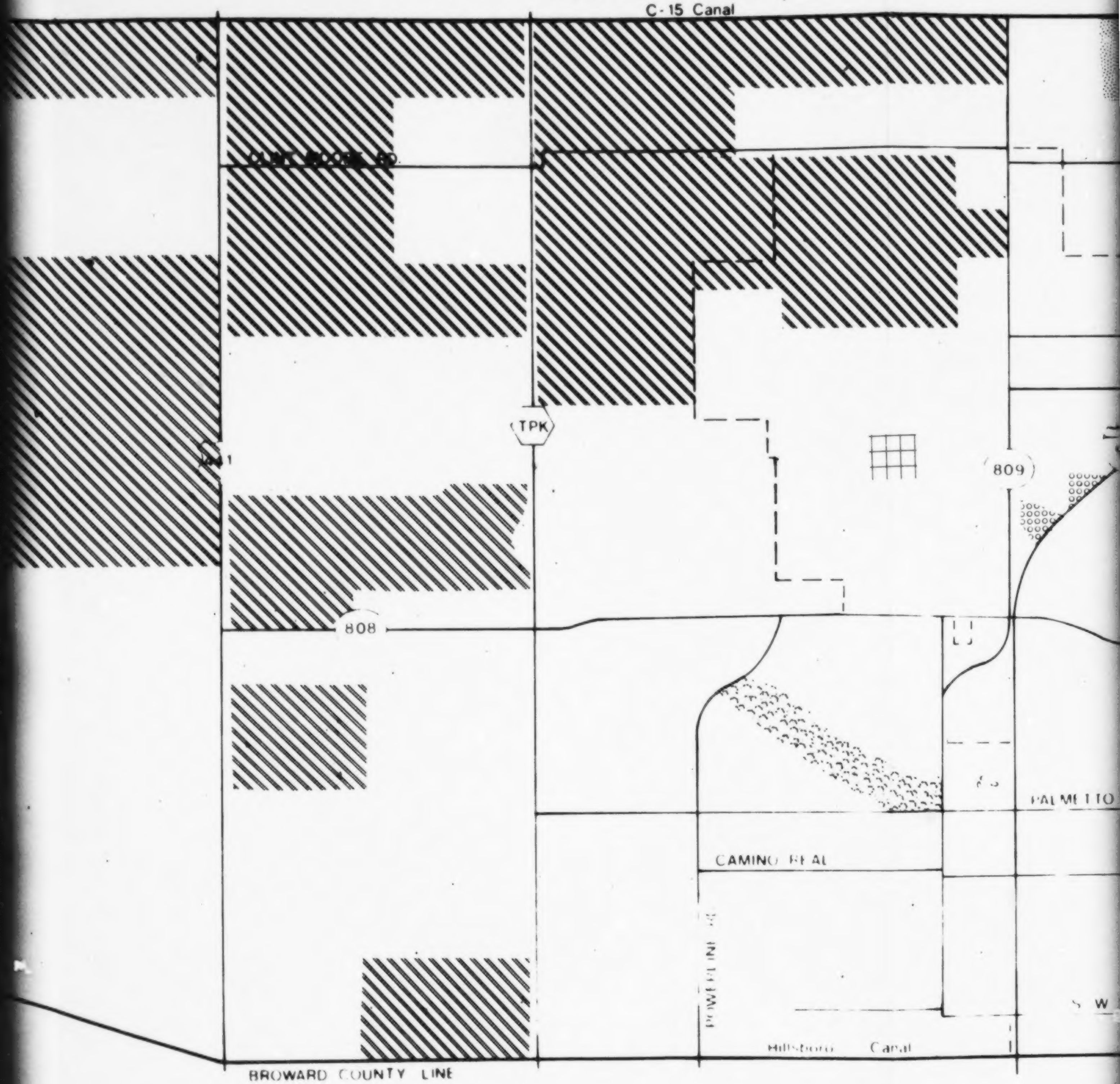
The winter vegetable cropland area described earlier in this chapter is shown in Figure III-2. It is projected that, if Palm Beach County land use policies remain unchanged, all of these lands will be converted to urban development by the Year 2000 with the exception of the area within the County, south of the Hillsboro Canal.


Legend
cypress swamp
red maple wetlands
endangered species habitats
manatee habitat
yamato scrub
marine grass beds
mangrove
coastal hammock
proposed regional park sites
winter vegetable cropland
CONSERVATION AREA 1 LEVEE
Hillsboro Canal
BROWARD

SOURCE: STOTTLER STAGG & ASSOC., 1979

SOUTHERN REGION PALM BE

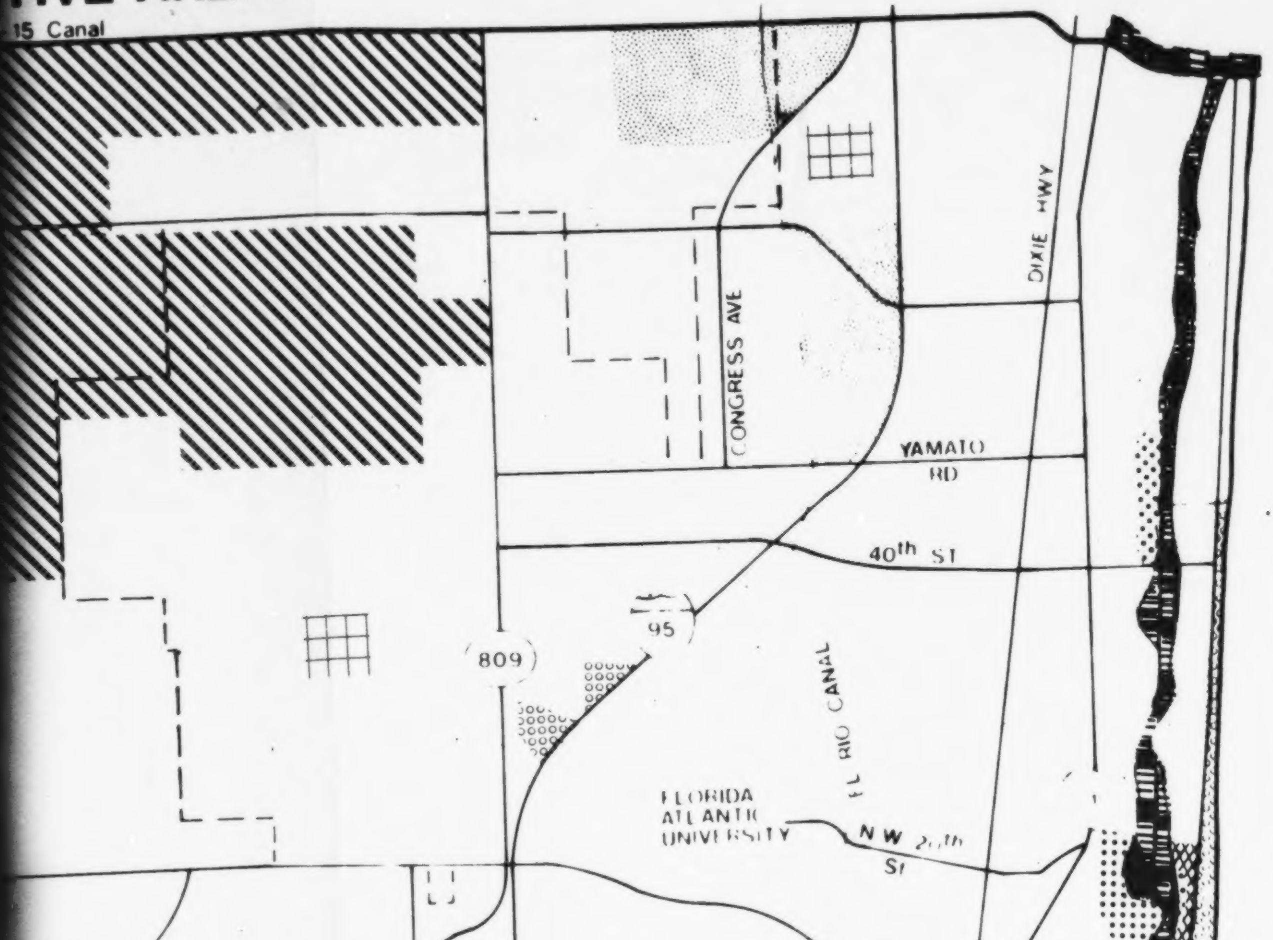
SENSITIVE AREA


C-15 Canal
CLINT MOORE RD
TPK
441
809
808
PALMETTO
CAMINO REAL
POWERLINE RD
S W
Hillsboro Canal
BROWARD COUNTY LINE

REGION PALM BEACH COUNTY 201 AREA EIS

TIVE AREA

15 Canal



DIXIE HWY
CONGRESS AVE
YAMATO RD
40th ST
95
809
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
N.W. 20th St
PALMETTO PK RD
CAMINO REAL
POWERLINE
S.W. 18th ST
Hillsboro Canal
A1A
ATLANTIC OCEAN

01 AREA EIS

fig III-7

The major impact to the sensitive areas discussed above is the conversion of the unique agricultural lands to urban dvelopment. These impacts are discussed in the land use section of this chapter.

Impacts to other specific sensitive areas may result from the projected conversion of most of the Planning Area to urban land uses. Local land use decisions will determine the extent of these impacts.

Part C: Mitigative Measures

Introduction

The most significant impacts which were identified in Part B of this chapter include; a continued high rate of development throughout the unincorporated area, continued in-filling in the already urbanized areas, the loss of unique agricultural lands, an increase in the overcrowding of community services and facilities, increased demand on the limited water supply capacity, and increased point and non-point source discharges to the Biscayne Aquifer. Other more minor impacts are related to construction activities and facility operation.

A significant part of the EIS process is the evaluation of measures which may be used to mitigate these potential impacts. Mitigative measures may be structural or non-structural in nature. For example, reducing the system capacity to preclude sewer service to Subbasins F and I is a structural mitigative measure. Non-structural mitigative measures are applied land management related practices. They include public acquisition of land and development rights, provision of incentives to encourage the protection of unique agricultural and environmentally significant lands, and land use regulation. The following mitigative measures are selected from an extensive array of techniques. The selected measures are presented because of their relevance to the identified impacts.

The committed nature of much of the Planning Area limits the effectiveness of some of the suggested mitigative measures. The purpose here is to provide a list of possible structural and non-structural actions that may be used to mitigate the impacts cited previously.

Non-Structural Mitigative Measures Relating to In-Filling

The principal impacts resulting from in-filling urbanized areas are the loss of desirable open space in the form of potential park and recreational sites, environmentally sensitive lands, and historic and archaeological sites, as well as an increased burden on public facilities. Appropriate non-structural mitigative measures include: (1) impact fees and dedication requirements, (2) identification and protection of significant historical and archaeological sites, (3) density transfers and density bonuses, and (4) land banking.

Impact fees and dedication requirements are typical measures utilized by local governments to reduce the impacts of in-filling in urbanized areas. Impact fees are charges paid to a local government by new users for the privilege of gaining access to the public services and facilities. The rate charged is the prorata share of the expense incurred by the local government in providing the public service or facility. Dedication requirements provide for the transfer to a local government of lands to be used as sites for public services and facilities.

Dedications operate on the same principal as impact fees. The increased burden upon public services and facilities created by new residents is offset by the developer providing land for additional schools, fire and police stations, or public parks and recreation facilities.

Impact fees and dedication requirements are included in local government land use regulations. PUD approval or final plat approval is often made contingent upon satisfaction of the dedication requirements or fee-in-lieu of payment.

The City of Boca Raton presently requires developers to dedicate land for parks and recreation purposes or pay a fee-in-lieu of the dedication. Developers of PUD's in Boca Raton may be required to dedicate land for community facilities, such as schools or government offices, if the City Council determines that these services are needed. In addition, impact fees are assessed for connecting to the City sewer and water systems. The Boca Raton impact fee and dedication requirements could be amended to specifically require the dedication of environmentally sensitive lands and significant historical or archaeological sites.

Protection of significant historic and archaeological sites is the process of identification, registration, protection, enhancement and management of culturally valuable sites or properties. It is the policy of the Federal government, the State, and the City of Boca Raton to protect significant historical and archaeological sites. For example, for every major federal action affecting the natural and man-made environment, Section 101(b)(4) of the National Environmental Policy Act directs the involved federal agency to "coordinate federal plans, functions, programs, and resources....preserve important historic, cultural, and natural aspects of our national heritage...." Chapter 267, F.S., the Florida Archives and History Act, provides for the protection of historic and archaeological resources on state lands and encourages their protection on privately-owned land. Chapter 79-255, Laws of Florida, provides a means for the State to purchase valuable historic and archaeological properties and bring them under the protection of the Archives Act. If preservation of significant sites is not feasible, provision is made for the recording of data contained in the objects, sites, or structures. Significant sites are those properties which are listed, or determined eligible for listing, in the National Register of Historic Places, in accordance with 36 CFR, Part 60 ("National Register of Historic Places; Nominations by State and Federal Agencies").

To protect unknown sites, the City and the County could require a developer to request from the Florida Division of Archives, History and Records Management a determination of the likelihood of presently unknown sites or properties occurring on the subject property. If the Division determines that the probability is high, then the performance of an historic and archaeological site assessment survey could be required as a condition precedent to development plan approval. Discovery of a significant site or property, as determined by the City or County upon recommendation from the Division, provides the basis to require private preservation by restrictive covenants, dedication for public purpose, public acquisition, recording of data or removal of artifacts.

A density bonus is a grant of additional density given to a developer in exchange for dedicating a parcel of land for a public purpose. The grant of additional density is an incentive to provide park and recreational sites, and to preserve environmentally sensitive lands, and historic and archaeological sites.

For a land dedication of any portion of a parcel of land, the City or County could allow a transfer of the maximum number of dwelling units allowed for the dedicated area to any other portion of that parcel, or any other parcel of land, within the City. To the extent that the dedication exceeds any existing standard, the City may allow a density bonus resulting in a total transfer of up to a designated factor (i.e., two (2) times the maximum number of dwelling units designated for the dedicated area) to any other portion or parcel within the City or County.

A density bonus may be awarded according to a sliding scale that ranges between one hundred percent (100%) and two hundred percent (200%) of the maximum number of dwelling units allowable on the designated parcel. The amount of the density bonus is determined according to the quality, location, quantity and value of the land dedicated. Density bonuses should be permissible only for (a) lands dedicated in perpetuity for a public purpose, (b) lands which exceed standard dedication requirements, and (c) lands not included in dedications for other public purposes such as road right-of-ways, utilities and other community facilities. Density bonuses are additionally useful in protecting environmentally sensitive lands located in the western portion of the Planning Area.

Land banking involves public acquisition of undeveloped land for a designated public purpose. Acquisitions may be made for the purpose of permanently holding property for present or future use as a public park or recreation facility. Land banking preserves open space and environmentally sensitive lands as well as historic and archaeological sites from being consumed by the process of in-filling.

The process of establishing a land banking operation involves selecting a local administrative agency to serve as the land banking institution, conducting a survey to identify, assess and determine specific parcels of land or development rights to be acquired, negotiating the purchase of desired sites or, possibly, commencing eminent domain proceedings to condemn the property, issuing municipal bonds or establishing other means of financing the acquisitions, taking title to the property, and implementing a management program.

Land banking implements the policies of the Boca Raton Comprehensive Plan, which recommends: acquisition and development of park sites based on environmental, social, and economic considerations, preservation of historic and archaeological features, and minimal or no development or redevelopment in areas designated "preservation" in order to protect the most significant natural and cultural features. Implementation of the Comprehensive Plan would satisfy the reasonable necessity requirement for public acquisition. The power of eminent domain might be unavailable to condemn land for a future purpose, unless the power is used to implement an adopted plan of acquisition and conversion of the land to the public use is reasonably imminent.

The existence of a Comprehensive Plan can provide the basis for a public acquisition program where the power of eminent domain might otherwise be unavailable. By amending the Comprehensive Plan to designate specific parcels of land for future open space use, the current status of land would be maintained until the landowner initiated negotiations for public purchase or inverse condemnation proceedings.

Non-Structural Measures Relating to Unique Agricultural Lands and Environmentally Sensitive Land

The principal impacts in the unincorporated portion of the study area are the continued conversion of productive agricultural lands to other uses. By not providing sewer service to Subbasins F and I and to unique agricultural lands, Alternatives 3, 7, 8, and 10 induce a lower rate of land development than the other alternatives. The selection of one of these alternatives would assure that Federal funds would not be used to promote the loss of unique agricultural and environmentally sensitive lands.

The non-structural mitigative measures addressed in this and the next sections could effect a significant limitation on the exercise of development rights. Adoption of a future land use plan element under the Florida Local Government Comprehensive Planning Act would be a prerequisite to successfully implementing a management program to protect unique agricultural and environmentally sensitive lands. The consistency requirement of the Act provides the legal basis for establishing a management system that limits the exercise of development rights. In Florida, conducting specific area studies, sometimes called neighborhood studies, sector studies, or critical area studies, has proven valuable in legally defending moratoria and conservation and environmental protection programs.

Area studies critically assess the different use-values and competing interests in a specific geographic area. They establish land management guidelines and principles to a much greater degree of specificity than those contained in a Future Land Use Element of the Comprehensive Plan.

In Metropolitan Dade County the Board of County Commissioners is empowered to declare certain lands to be "areas of critical environmental concern." In designating such areas, the Commissioners must specify by ordinance the boundaries of the area, the reasons why the particular area is a critical environmental concern to the County, the dangers that would result from uncontrolled or inadequate development of the area, and the advantages that would be achieved from the development of the area in a coordinated manner. The ordinances must also establish specific land use regulations, which may be in addition to any existing zoning, to ensure the protection of the area. The regulations provide environmental performance standards relating to such matters as site alteration, water control and flood protection, wastewater disposal and development clustering. The ordinances may also establish site alteration permit requirements and procedures for variances. In many respects, the County program is patterned after the "Areas of Critical State Concern" program contained in Chapter 380, F.S., the Florida Environmental Land and Water Management Act of 1972.

The Dade County program differs from the original State Act in the crucial aspect that the critical areas are designated by the County legislative body. Undertaking an area study should be considered as an aid in implementing a land management program.

Agricultural zoning is zoning to preserve agricultural use. As an exclusive use zone, permitted development in agricultural districts is restricted to farming activities. The classification permits farm-related housing and agricultural-oriented industry, such as mechanized harvesting, processing and packing procedures. To be effective, agricultural zoning should correspond to existing agricultural land holding pattern. For example, if the predominant character of holdings is fifty (50) acres, the agricultural zoning should establish a one (1) unit per fifty (50) acres minimum area requirement. The assumption is that current land holdings maintain farm productivity and economic efficiency. By applying an agricultural zoning classification to a specific area identified in an area study as unique agricultural land, agriculturally productive parcels might be assembled and preserved.

Agriculturally productive land may lie fallow because it is being held for development. Where necessary, down-zoning could induce the land back into agricultural use. Although intensive development of the land would be prohibited, the remaining agricultural use may afford a landowner reasonable beneficial use of the property. Generally, down-zoning is more legally defensible where the least amount of committed development is present.

Public acquisition of development rights can assist in assembling agricultural lands, especially where down-zoning is not useful. Development rights represent the development potential of the land. Development rights are purchased by the government, giving it the right to restrict that acreage to agricultural uses. Ownership of the agricultural land remains with the property owner, as does the right to use the property for agricultural purposes. Private markets for the purchase and sale of development rights to agricultural land are created by a Transferable Development Rights Plan.

Transferable Development Rights (TDR) is a concept that permits a shifting of density from land less suitable for development to land which is suitable for more intensive use. The conceptual basis of TDR is that the value of a parcel of land is measured by both its existing use and its development potential. Development potential for the purposes of TDR is determined by the maximum allowable density assigned to a particular tract of land. A TDR plan is established by a TDR ordinance designed to accomplish a particular objective. New York and Chicago enacted TDR ordinances to protect historic and architectural landmarks. The TDR Ordinance of Collier County, Florida is designed to preserve the semitropical swamps which comprise much of the undeveloped land in the County. Bucks County, Pennsylvania uses a TDR plan to preserve agricultural lands. The most effective uses of TDR have been to preserve environmentally sensitive and agriculturally significant land. A TDR plan can be designed specifically for the purpose of preserving unique agricultural lands.

Prior to enactment of a TDR ordinance, a planning authority would designate restricted zones and transfer zones. Restricted zones are selected on the basis of their agricultural significance. The development rights of property located in the restricted zones can be transferred to areas suitable for higher density use. The TDR ordinance would designate agricultural uses as the exclusive classification in the restricted zones. The amount of land which can be preserved for agricultural use is a function of the maximum additional dwelling units which a receiving area, called transfer zones, can accommodate. The maximum density the transfer zones can accommodate less their existing allowable density determines the maximum additional dwelling units that can be transferred. The maximum additional dwelling units are then allocated among the acreage in the restricted zones to determine the development rights ratio.

The development rights ratio is the amount of dwelling units attributed to each acreage of restricted lands. If, for example, there are 3,000 maximum additional dwelling units that can be accommodated by the transfer zones and 1,000 acres of land to be preserved, then the development rights ratio is three (3) dwelling units per one (1) acre of restricted land.

The development rights ratio is affected by land values. For a TDR program to work, landowners must be compensated for the loss of development potential. The value of the allocated dwelling units must equal the value of the lost development potential. In addition, the value of the development rights is determined by the ability of the transfer zone to absorb them. The transfer of development rights should be managed to avoid exceeding the capacity of the transfer zone.

Participation in a TDR program may be mandatory or voluntary. The TDR plan in Collier County, Florida is a mandatory program that has operated effectively since 1974. The Collier County Plan provides that owners of restricted land designated "ST" (Special Treatment) must apply for a development order before they can proceed with a plan of development. If the County finds the proposed use to be in conflict with the ecological balance to be preserved by the TDR ordinance, the development order is denied. The landowner is compensated for this loss of development potential by the issuance of development rights.

The holder of development rights can sell all or part of those rights on the open market or transfer the density to other parcels owned in the transfer zone. Development rights transferred to receiving parcels are recorded in the same manner as deeds or easements.

Title to the land in the restricted zone can remain with the original owner; however, it is subject to an agricultural use deed restriction. The deed restriction is created by the County and it is amendable to allow future generations to intensify the land use. In Bucks County, Pennsylvania, where TDR is used to preserve agricultural lands, the TDR ordinance provides landowners in the restricted zones with rights to develop one (1) house per twenty-five (25) acres, or the right to develop .5 dwelling units per acre in a cluster using ten (10%) percent of the parcel.

Marketability of TDRs is essential to the effectiveness of this program. If market analysis reveals that the demonstrated demand for TDRs is low, then the program should be designed to preserve only the most significant agricultural land in the study area. In defining the areas of most productive land, the economies of scale which accompany conventional farming techniques should be considered.

The designated environmentally sensitive lands are susceptible to environmental degradation. Uses should be permitted that do not adversely affect the productivity of the area. Productivity can be protected by establishing environmental performance standards and an environmental assessment requirement. Environmental performance standards identify the values that must be protected, but they do not necessarily provide how the results will be achieved. The following examples of environmental performance standards are taken from the Dade County Development Master Plan (1975):

> "The following guidelines are considered minimum guidelines and apply to all of Dade County except where a greater degree of protection is offered by a guideline with a specific environmental protection zone or subzone.
>
> Within impacted hammocks (40-60% exotic plants) construction is, to the maximum extent possible, to be confined to area characterized by exotic vegetation. A maximum 50% site alteration is permitted.
>
> Within all areas of allowable site alterations, the existing native vegetation is to be incorporated into the landscape plan of development to the maximum extent possible."

Environmental performance standards require the developer to demonstrate that the proposed development will not adversely affect the environmental integrity of the area. Maximum design flexibility should be allowed when incorporating the standards into the plan of development. An environmental or community impacts statement provides the mechanism for assessing the impacts of the project and achieving resolutions to internalize or mitigate those aspects. Impact analyses serve to rationalize the public purpose to preserve environmentally sensitive lands and the private purpose to make reasonable beneficial use of land.

Mitigative measures also include financial techniques and incentives to reduce adverse impacts. Financial techniques include the public acquisition by fee-simple purchase, purchase of development rights or purchase of easements to historic and archaeological sites and unique agricultural and environmentally sensitive lands. In certain cases, the public might acquire the development rights to prime agricultural land where a TDR plan is not useful. With the purchase of development rights or easements, ownership of the property remains in the private sector and on the roles.

Incentives can be provided to the public sector to encourage the voluntary protection of unique agricultural and environmentally sensitive lands. Incentives may accomplish the protection objectives without placing substantial costs on either the property owner or the local government. Incentives include tax relief and increased flexibility in site development, such as clustering, density transfer and density bonuses.

The most common form of tax relief is preferentially assessing agricultural land. This technique relieves some of the development pressure felt by the farmers who own land along the urban fringe, even though the tax advantage afforded agricultural land may be marginal. Further tax incentives are available under S704.06, F.S., which encourages the donation or sale of conservation easements. Conservation easements are perpetual interests intended to retain land and water areas in their natural, scenic, open or wooded condition to serve as suitable habitat for fish, plants, or wildlife. The sale of conservation easements is more attractive to the landowner than dedication of such easements. The tax advantages associated with conservation easements may be marginal when compared to the sale price of developable land.

The federal income tax laws encourage individuals and corporations to donate private resources to public use. Tax benefits are attainable through the long-term capital gains and charitable donation provisions of the Internal Revenue Code. By properly managing long-term capital gains and charitable donations, taxable income can be substantially reduced.

An out-right conveyance in fee-simple usually provides the greatest tax benefit to the donor. Restrictions on future use and management may be included in the deed of transfer. The retention of a life estate as part of an outright donation of land permits the donor to retain the right to live on the property for the rest of his life. If the donor reserves a life estate and the property is a personal residence or a farm, the value of the gift is discounted by the computed value of his life estate. Testamentary gifts, wills, and living trusts are methods by which a donor's wishes for use of the land can be carried out after his death. A donor's intent to protect the property may be accomplished through restrictions placed in the deed of transfer. Restrictions reflect the retention of certain rights and may decrease the fair market value of the transferred property.

A sale-and-leaseback arrangement involves the acquisition of land by purchase or gift and the subsequent leasing of the land to the grantor for a specific purpose. A bargain sale, which is a combination of selling and donating, or selling for less than full market value, can provide a federal income tax deduction equal to the difference between full market value and the actual selling price and may allow for a reduction in federal capital gains tax.

Mitigative Measures Related to the Provision of Community Services and Facilities

A development timing ordinance postpones the issuance of development permits until an area is adequately served by public facilities and services. Tied to a public capital improvements program, development proceeds in a logical pattern of phased growth. Applied to the unincorporated portion of the Planning Area, a development timing ordinance channels growth into those areas which are prepared for development.

Ramapo's (New York) development timing ordinance is the model. The Ramapo ordinance requires developers to apply for a "special use permit". The issuance of a "special use permit", authorizing residential development, is contingent upon the proposed development satisfying a fifteen (15) "development point" requirement. Development points are calculated and awarded on a sliding scale from zero (0) to five (5). The closer the development site is to the following public facilities and services, the higher the number of points awarded:

1. Public sewers or approved substitutes,
2. Drainage way,
3. Improved public park or recreational facilities, including public school sites,
4. State, county, or town roads improved with curbs and sidewalks, and
5. Fire houses.

The ordinance further provides for a public capital improvements program to be completed within a maximum of eighteen (18) years. Developers may accelerate the permitting of their site by providing the requisite facilities and services themselves. The Ramapo plan has received judicial approval from the New York Court of Appeals, the highest court in the state.

Local government authority to deny access to public facilities to control growth is unsettled in Florida. Alternatives 3, 7, 8, and 10 would deny service to Subbasins F and I and to unique agricultural lands. The Local Government Comprehensive Planning Act requires local governments to establish and implement a comprehensive planning program to guide and control future development. A development timing ordinance may be a permissible means of implementing a growth control plan.

Holding zones are barriers to intensive residential development. Agricultural zoning and large-lot zoning are means of establishing holding zones. Both types of zoning create low-density residential patterns of development, generally single-family homes on lots ranging from a minimum of one (1) to six (6) or more acres. Establishing holding zones reduces the rate at which agriculturally and environmentally sensitive lands are converted to more intensive uses.

It is most important that, once a Comprehensive Planning Program is in effect, the local governing body be consistent in the administration of its provisions. Community facilities and capital budgeting plans can never be effective if the timing and density of development is allowed to change because of development pressures. A local government in a high growth area which does not implement a development strategy keyed to its ability to provide needed facilities and services for this growth may have to force its citizens to bear the burden of ever-increasing taxes in an attempt to alleviate overcrowded facilities.

Implementation of mitigative measures may be limited by the legal doctrines of vested rights, equitable estoppel, and the "taking" issue. The doctrine of vested rights derives from provisions of the United States and the Florida Constitutions. It focuses upon whether a contemplated use has "ripened" into a property right. A property right cannot be destroyed or impaired by subsequently enacted land management regulations without due process of law.

The doctrine of equitable estoppel was incorporated as part of the jurisprudence of the United States and of the State of Florida. Equitable estoppel is raised as a defense to the application of land management regulations. To establish the defense, the developer must demonstrate that by relying in good faith or upon some act or omission of the government he has made such a substantial change in position or incurred such extensive obligations that it would be highly unjust to destroy the right he has acquired.

These doctrines may be invoked in an effort to defeat a land management program or the application of mitigative measures to a particular parcel of land. To protect a land management system from legal attack, it is important to clearly define the public purpose to be served; to carefully relate land management techniques to the public purpose; to continually refine the guidelines and standards for implementing the techniques. It is also important to base land use decisions upon competent data and to avoid legal contests by internalizing conflict within local administrative procedures. For instance, a vested rights determination should first be made by the local government at the administrative level rather than the judiciary. Local administrative processes should be established to attempt to resolve the issues without litigation.

Mitigative Measures Related to the Biscayne Aquifer

The implementation of Alternative 8 would lead to the increased discharge of treated wastewater to the Biscayne Aquifer. A continuing monitoring program would be required to determine any future need for further action.

Increased growth and development will occur whichever alternative is selected. This will lead to increased non-point sources urban infiltration to the Aquifer. Implementation of runoff controls presented in the Palm Beach County 208 Plan would be effective in mitigating these impacts.

Mitigative Measures Related to Increased Demand on Water Supply

The continued increasing demand on the areas drinking water resources has led to awareness in the area of the need for conservation. The installation of water saving devices for the home should be a top priority. Reuse of wastewater has been a part of several alternatives in this EIS. Some of these measures, such as spray irrigation within the City of Boca Raton and dual water systems, which are not now cost effective may become more viable in the years to come. Backpumping to the conservation area may also be a future possibility.

Mitigative Measures Related to 201 Facility Construction

The impacts of noise will be noticeable only during construction activities. Long-term impacts of noise will be associated with treatment plant and pump station operation but should be minimal. Construction impacts can be mitigated by:

1. Requiring sound control devices on construction equipment.
2. Limiting construction acitivities to normal business hours.

The major soil impact will be through soil erosion during construction. This impact can be reduced by:

1. Limiting the size of the pipeline corridor to the minimal possible areas of disturbance.
2. Prepare and strictly enforce construction plans which require the rapid stabilization and revegetation of construction areas.

3. Institute best management controls in order to reduce the amount of non-point runoff from construction sites.

There is a potential that undetected archaeological and/or historical resources could be present within areas of planned construction. Construction of pipelines could ruin the value of these resources. In order to mitigate or avoid any adverse impacts to historic and archaeological resources, a qualified archaeologist should perform a standard archaeological and historic sites survey prior to construction, if requested by the State Historic Preservation Officer and State Archaeologist.

A vegetative survey of all planned construction areas can help mitigate impacts to unique vegetative communities. This is a standard procedure in 201 projects.

Public Utilities
Department
BOCA RATON
FLORIDA

CHAPTER IV - DESCRIPTION OF THE PREFERRED ALTERNATIVE

The underlying theme of this EIS is that the selection of a wastewater management program for the Southern Region of Palm Beach County should be compatible with the protection of the area's sensitive resources, particularly the unique agricultural land and the Biscayne Aquifer recognizing the extensive development pressure on this area.

In light of the impacts of growth and development in the Planning Area and the demonstrated lack of existing water quality problems, EPA has selected a modification of no Federal action as the preferred alternative. This approach as shown in Figure II-13 is described below.

EPA would fund the expansion of the Glades Road Facility to 17.5 MGD to serve subbasin A. Treatment at Glades Road would consist of secondary treatment using activated sludge. Disposal of wastewater would be by ocean outfall. Flow equalization of treated effluent would be employed at Glades Road in this alternative. A more detailed description of this alternative can be found in the 201 Plan. Present worth cost would be approximately $13.2 million.

EPA would not fund the provision of any wastewater facilities in the Palm Beach County portion of the Planning Area. Under this alternative, it is expected that the existing facilities will continue to be utilized and expanded with 100% local funding in the future.

The three County plants would probably remain in service until their capacities were reached between 1988 and 1990. These plants could then be expanded to 6 MGD each at the Sandalfoot and American Homes and .7 at Pheasant Walk with discharge to percolation ponds or to the City's ocean outfall. A third alternative for the County would be pumping all wastewater to the Glades Road Plant for treatment and disposal. An agreement would have to be reached between the City and County concerning the appropriate option for implementation. Approximate cost of County action under any of these options would be $21 million.

As part of this EIS, EPA initiated a more detailed monitoring program to determine the impact of the percolation ponds on the Biscayne Aquifer. The results of this sampling program are presented in Appendix A in this Final EIS.

Florida DER and the Palm Beach County Health Department will continue their monitoring programs at the percolation ponds and water supply wells in the future. If a buildup of nitrate levels becomes evident, an alternative form of wastewater disposal such as Boca Raton's ocean outfall, may become necessary. In this eventuality, Federal funding may be available to the County.

The EIS analysis has found two sludge disposal alternatives to be cost-effective and environmentally sound. One of these involves the co-disposal of sludge and refuse and would take place in modular combustion units. Steam generated from the co-disposal process would be recovered to produce electric power and to heat condition sludge. Ash and residual from the MCU's would be landfilled or used as subbase for bicycle paths throughout the City as part of a resource recovery process. The second alternative involves using centrifuge or belt filter press dewatering followed by landfilling at an approved Palm Beach County facility. The final selection will be made in the Final 201 Plan.

CHAPTER V - CHANGES TO THE DRAFT

Two major additional pieces of information have been developed since publication of the Draft EIS. The first involves an analysis of alternatives for sludge treatment and disposal which has been completed by the 201 Consultant, Camp, Dresser and McKee. This analysis identifies two alternatives, land-filling and co-disposal, as cost effective and environmentally suitable. The complete development and evaluation of sludge management alternatives is presented in Part I of Chapter II.

The second major addition is the completion of the sampling report on the effects of the existing percolation ponds. The Plan of Study for this sampling program was presented in the Draft EIS. Because of the extremely small flow at the Pheasant Walk Percolation Pond, that facility was excluded from the sampling program. The results of the sampling program at the Sandalfoot Cove wastewater treatment plant indicate that there are no significant water quality problems related to the operation of this facility. The complete results of the sampling program are presented in Appendix A of this Final EIS.

A small number of corrections have also been made to the content of the Draft EIS as a result of the written comments received. These comments and the appropriate responses are presented in Chapter VI.

None of the additional information which has been generated since publication of the Draft EIS affects the selection process for the preferred alternative. In fact, the results of the sampling report reinforce EPA's previous conclusion that the percolation ponds are having no adverse impacts upon water quality.

CHAPTER VI - EIS COORDINATION

Part A: Introduction

Public participation is an important part of the EIS process. It provides for active public involvement beginning with the development of the EIS Plan of Study and continuing throughout the process to the actual publication of the Final EIS. In the Southern Region EIS, this process included coordination with local, regional, state, and federal agencies; the establishment of a Technical Advisory Committee; a Public Scoping Meeting; establishment of an Environmental Review Comittee; a public meeting on the alternatives; and a public hearing on the Draft EIS.

Part B: Coordination With Local, Regional, State, and Federal Agencies

Throughout the EIS process, many agencies were involved in the review of all interim outputs and the compilation of needed data. Most of this input was generated by the Technical Advisory Committee (TAC). This Committee met periodically throughout the study and provided input into such matters as implementability of the alternatives, environmental impacts of the existing outfall and percolation ponds, and the adequacy of the existing water supply for the projected population. Table VI-1 identifies the members of the TAC.

TABLE VI-1
MEMBERSHIP LIST
TECHNICAL ADVISORY COMMITTEE (TAC)

Robert E. George
Department of Commmunity Development
City of Boca Raton

Arthur G. Turner, Jr.

Richard D. Stalker
Palm Beach County Area Planning Board

Harry King
Palm Beach County Planning, Building & Zoning Department

James Stallings
Public Utilities Department
City of Boca Raton

Norman Cortese
Arvida Corporation

Richard Gregg and Steve Reel
South Florida Water Management District

Warren Strahm and Herbert Zebuth
Florida Department of Environmental Regulation

Part C: Public Participation Program

Public Scoping Meeting

A public scoping meeting was held in Boca Raton on October 19, 1978 to explain the EIS process and discuss with the public the major issues which should be addressed in the EIS. The major issues raised by the public concerned the effects of providing wastewater facilities on growth and development and the pros and cons of various means of wastewater treatment and disposal.

Environmental Review Committee

The establishment of an Environmental Review Committee (ERC) was an important aspect of the Southern Region EIS public participation program. The ERC was formed with the express purpose of focusing the attention of local residents and public agencies on the EIS. The Committee consisted of 18 members and was representative of a cross-section of local interests. See Table VI-2 for a list of the ERC members. Each member of the group was asked to review and comment on all study materials, as well as to offer any other input during the course of the study. Several Committee Meetings were held throughout the study.

The first meeting of the ERC was held on March 22, 1979. The major purposes of this meeting were to explain the role of the Committee in conducting the EIS and discuss the Plan of Study. There were no objections offered by the ERC members to the orientation of the EIS.

The next ERC meeting was held on August 1, 1979. The purpose of this meeting was to discuss the Draft Baseline Environment Task Report which had been distributed in early July. A videotape summary of the report was presented. Questions were raised concerning the approved 208 population projections and the effect of the EIS in controlling development in the Planning Area. It was explained that EPA has no authority or desire to control growth and development. This is the job of the local governments in the area. Several additional questions were raised concerning the alternatives to be considered for wastewater treatment and disposal. This issue was to be the major topic of the next few meetings.

MEMBERSHIP LIST
EIS REVIEW COMMITTEE

Mr. William E. Bowman, Jr.
Vice President, Palm Beach County Farm Bureau
Route 1, Box 297
Delray Beach, FL 33445
305/499-3305

ALTERNATE:
Mr. Robert A. Hutzler
Palm Beach County Farm Bureau
P. O. Box 389
Delray Beach, FL 33444
305/391-4800

Mr. Norman Cortese
Vice President, Arvida Corporation
998 South Federal Highway
Boca Raton, FL 33431
305/395-2000

Mr. Myron Darmohray
Chairman, Environmental Development & Zoning Board. City of Boca Raton
201 West Palmetto Park Road
Boca Raton, FL 33432
305/395-4144

Mr. F. A. Garrity
Citizens for Reasonable Growth
777 S.W. 7th Street
Boca Raton, FL 33432
305/391-0845

Mr Richard Grimes
Member, Boca Raton Board of Realtors
Florida Vantage, Inc.
4295 N.W. First Avenue
Boca Raton, FL 33432
305/391-9900

ALTERNATE:
Mr. James Firley
Member, Boca Raton Board of Realtors
222 S.E. First Avenue
Boca Raton, FL 33432

Mrs. Homer Gwinn
Member, Boca Raton Garden Club
3774 N.E. Second Court
Boca Raton, FL 33431
305/395-0934

Ms. Judith G. Hanley
Member, Florida Atlantic Builders Association
Costain Florida, Inc.
181 N. Crawford Boulevard
Boca Raton, FL 33432
305/368-7510

Ms. Suzanne Hunter
Environmental Control Officer, Palm Beach County Health Department
901 Evernia Street
West Palm Beach, FL 33409
305/837-3136

Mr. Carey Lockman (Interim)
Palm Beach County School Board
3323 Belvedere Road
West Palm Beach FL 33406
305/683-0050

Dr. Alex Marsh
Department of Biological Sciences
Florida Atlanta University
Boca Raton, FL 33432
305/395-5100

Mr. A. H. Mattson
Chairman, Water & Sewer Committee
Federation of Boca Raton Homeowners Assn.
570 N.E. Golden Harbour Drive
Boca Raton, FL 33432
305/395-7367

Mr. Warren Newell
Boca Associates, Inc.
7000 W. Camino Real Road, Suite 240
Boca Raton, FL 33433
305/391-8800

Mrs. Constance Nunnally
League of Women Voters of South Palm Beach County
1599 SW 7th Terrace
Boca Raton, FL 33432
305/368-8753 or 482-7200

Mr. Alan Parmalee
President, Royal Palm Audubon Society
4765 N.W. Sixth Court
Delray Beach, FL 33445
305/272-0996 or 832-7454

Mr. John A. Pollock
Manager, Facilities Engineering &
Maintenance, IBM, Dept. 71A
P. O. Box 1328
Boca Raton, FL 33432
305/994-3303

ALTERNATE:
Mr. James F. Armater
Manager, Facilities Services, IBM
P. O. Box 1328
Boca Raton, FL 33432

Ms. Vickie Prinz
Field Representative, Florida
Wildlife Federation
4080 N. Haverhill Road
West Palm Beach, FL 33407
305/683-2328

ALTERNATE:
Mr. Pete Aldrich
Administration Aide, Florida
Wildlife Federation
4080 N. Haverhill Road
West Palm Beach, FL 33407
305/683-2328

Mr. J. (Lyn) Stevens
Greater Boca Raton Chamber of Commerce
Stevens Corporation
156 N.W.16th Street
Boca Raton, FL 33432
305/392-3268

Mr. Richard E. Wolf
Environmental Control Officer, Inspection
Division, Public Service Department
690 Kingsbridge Street, Apt. 8
Boca Raton, FL 33431
305/395-1110 X230

Ex-Officio Members

Mr. Robert Cooper
EPA Project Officer
EIS Branch Region IV
345 Courtland Street
Atlanta, Georgia 30308
404/881-7458

Mr. Charles D. Cashman
Administrator, Utilities Services
Department, Palm Beach County
P. O. Box 16097
West Palm Beach, FL 33406
305/686-3813

Mr. J. Scott Benyon
Florida Department of Environmental
Regulation
P. O. Box 3858
West Palm Beach, FL 33402
305/689-5800

Mr. Larry G. Slayback
201/EIS Coordinator
201 W. Palmetto Park Road
Boca Raton, FL 33432
305/395-1110 or 392-5342

The third meeting of the ERC was held on September 12, 1979 to discuss the 201 Consultant's Alternatives Development Report. This report emphasized alternatives using the existing ocean outfall for disposal of wastewater. Numerous questions were raised at the meeting concerning the lack of detail explaining the conclusions of the report and the lack of consideration of more innovative means of wastewater disposal. Due to these concerns, two additional meetings were held with the ERC to discuss the development of alternatives. On September 19, 1979 the 201 consultant presented more details concerning his alternatives development work.

In response to the outcome of the two previous ERC meetings, a meeting of the ERC was scheduled by EPA on October 31, 1979 to describe the final list of alternatives selected for detailed evaluation. EPA expanded the list originally submitted by the 201 consultant to include alternatives involving the use of land application of wastewater for ultimate disposal. In addition, an expanded scope for the environmental evaluation of alternatives was discussed.

Two ERC meetings were held to discuss the detailed evaluation of alternatives. On April 30, 1980 the 201 Consultant's Evaluation Report was discussed; and on May 7, 1980 the EIS Consultant's Evaluation Report was considered. Both meetings produced wide-ranging discussions concerning the projected impacts of the alternatives.

Public Meeting on Alternatives

A public meeting was held on May 15, 1980 to receive public reaction to the proposed wastewater management system alternatives. Presentations were made by both consultants summarizing their work to date with emphasis on the detailed evaluation of alternatives. Comments from the public centered on the potential adverse impacts of population growth upon community services and facilities, particularly water supply; Palm Beach County Land Use Policy; and potential impacts of the ocean outfall.

Public Hearing on the Draft EIS

A public hearing was held on November 17, 1981 to receive public reaction to the Draft EIS. Comments from the public were favorable to the proposed action selected in the Draft EIS. The transcript of the public hearing is presented in Part E of this chapter. Part F presents responses to comments made at the public hearing as well as responses to the written comments received on the Draft EIS which are presented in Part D. The comments which are answered in Part F are numbered in the right hand margins of Parts D and E.

FLORIDA DEPARTMENT OF STATE
George Firestone
Secretary of State

November 3, 1981

In reply refer to:

Mr. Louis Tesar
Historic Sites Specialist
(904) 487-2333

Mr. John E. Hagan, III, P.E.
Chief, EIS Branch
Environmental Protection Agency
Region IV
345 Courtland Street, Northeast
Atlanta, Georgia 30365

Re: Cultural Resource Assessment Request
Draft EIS, Selected Alternative for Southern Region,
Palm Beach County Area 201, Florida
SAI FL8110280534E

Dear Sir:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Procedures for the Protection of Historic and Cultural Properties"), we have reviewed the above referenced project for possible impact to archaeological and historical sites or properties listed, or eligible for listing, in the National Register of Historic Places. The authorities for these procedures are the National Historic Preservation Act of 1966 (Public Law 89-665) as amended by P.L. 91-243, P.L. 93-54, P.L. 94-422, P.L. 94-458, and P.L. 96-515 and Presidential Executive Order 11593 ("Protection and Enhancement of the Cultural Environment").

A review of the Florida Master Site File indicates that no archaeological or historical sites are recorded for the project area. Furthermore, because of the location of the project, it is considered highly unlikely that any significant, unrecorded sites exist in the vicinity. Therefore, it is the opinion of this office that the proposed project will have no effect on any sites listed, or eligible for listing, in the National Register of Historic Places, or otherwise of national, state or local significance.

On behalf of Secretary of State George Firestone, thank you for your interest and cooperation in the protection of Florida's irreplaceable historic resources.

Sincerely,

George W. Percy
Deputy State Historic
Preservation Officer

GWP:Teh

cc: Ron Fahs

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United States Department of the Interior
OFFICE OF ENVIRONMENTAL PROJECT REVIEW
Southeast Region / Suite 1384
Richard B. Russell Federal Building
75 Spring Street, S.W. / Atlanta, Ga. 30303

ER-81/2000 November 24, 1981

Mr. John E. Hagan, III, P.E.
Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Sir:

We have reviewed the Draft Environmental Statement for Wastewater Facilities, Southern Region Area, Palm Beach County, Florida, and have the following comments.

General Comments

The proposed project will not adversely affect any existing, proposed, or known potential units of the National Park System, or any local recreation areas of our mandated interest or jurisdiction.

Also, we find that it adequately describes the potential direct and
indirect effects of the proposed wastewater facilities on fish and
wildlife resources. Examination of our records indicates no impact on
the mineral industry will occur should the recommended plan be imple- I
mented. However, for completeness, we suggest a summary of the mineral
resources of the area be included in the report. Limestone, sand, and
gravel resources occur near the proposed facility. Possible restric-
tions on future mineral exploration and development that may arise due
to project implementation should also be addressed.

Specific Comments

Page III - 31, paragraph 6

The first sentence of paragraph 6 states that "Construction activities
associated with wastewater treatment facilities and with projected 2
growth and development may destroy historical and archeological re-
sources unless appropriate precautions are taken." These precautions

should include continued consultation with the State Historic Preservation Officer (documented in the final environmental statement) to prevent or minimize adverse impacts. In the event of emergency discovery of cultural resources during construction, the Secretary of the Interior should be notified through the Departmental Consulting Archeologist, National Park Service, Washington, D.C. 20240 (telephone 202/272-3750).

Thank you for the opportunity to comment on this statement.

Sincerely,

James H. Lee

James H. Lee
Regional Environmental Officer

REGION IV - EPA

United States
Department of
Agriculture

Soil
Conservation
Service

P. O. Box 1208
Gainesville, FL
32602

Subject: EVT - Draft Environmental Impact Statements

Date: November 13, 1981

To: John E. Hagan III, P. E.
Chief, EIS Branch
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

File Code:

We have no comments on the Draft Environmental Impact Statement on proposed Wastewater Facilities for Boca Raton, Florida.

James W. Mitchell
State Conservationist

cc: Norman Berg, National Office

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DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta, Georgia 30333
(404) 262-6649

November 19, 1981

John E. Hagan, III, P.E.
Chief, EIS Branch
Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Hagan:

We have reviewed the Draft Environmental Impact Statement (EIS) for Wastewater Facilities, Southern Region, Palm Beach County, Florida. We are responding on behalf of the Public Health Service.

It is our understanding that although sludge treatment and management are
not discussed in the Draft EIS, the Final EIS will address this issue. We
also understand that EPA is initiating a more detailed monitoring plan to 3
determine the impacts of the percolation ponds on the Biscayne Aquifer and
that these study results will also be presented in the Final EIS.

Implementation of the preferred alternative, Alternative 8, will lead to increased discharge of treated wastewater to the Biscayne Aquifer and a continued monitoring program will be required. The Final EIS should describe the monitoring program that will be followed to determine future need for further action.

Since some of the area that is affected by this project is farmland, the Final
EIS should state whether or not the project conforms to the Council on Environ-
mental Quality's and the Department of Agriculture's joint memorandum of 4
August 30, 1976, concerning the effect of the project on prime and unique
farmland.

Thank you for giving us the opportunity to comment on the Draft EIS. Please send us a copy of the Final EIS when it becomes available. If you should have any questions about our comments, please contact Mr. Lee Tate of my staff at 262-6649.

Sincerely yours,

Frank S Lisella

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Center for Environmental Health

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DEPARTMENT OF THE AIR FORCE
REGIONAL CIVIL ENGINEER, EASTERN REGION (HQ AFESC)
526 TITLE BUILDING, 30 PRYOR STREET, S.W.
ATLANTA, GEORGIA 30303

REPLY TO
ATTN OF: ROV2 30 September 1981

SUBJECT: Draft Environmental Impact Statement (DEIS) - Wastewater Facilities, Southern Region Area, Palm Beach County, Florida

TO: U. S. Environmental Protection Agency
Region IV
Attn: Mr. John E. Hagan, III, P.E.
Chief, EIS Branch
345 Courtland Street, N. E.
Atlanta, Georgia 30365

1. We have reviewed the subject DEIS and find that development of the proposed project will not impact Air Force operations in Florida.

2. Thank you for the opportunity to review this DEIS. Our point of contact is Mr. Winfred G. Dodson, telephone number 221-6821/6776/5313.

THOMAS D. SIMS
Chief
Environmental Planning Division

Cy to: USAF/LEEV

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FEDERATION OF BOCA RATON
HOMEOWNER ASSOCIATIONS

November 29, 1981

Mr. John E. Hagan III, P.E.
Chief, EIS Branch
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365
404/881-7458

Dear Mr. Hagan:

This is to clarify our oral comments at the November 17, 1981, hearing on the Draft EIS for the Wastewater Facilities for the Southern Region Area of Palm Beach County, speaking on behalf of the Water & Sewer Committee of the Federation of Boca Raton Homeowner Associations.

Alternatives 2, 5, and 9, as described on pp. iii, iv, & v are impractical because of the costs, compared to the limited benefits of "useful" water which would be such a trivial fraction of the area's rainfall. e.g., 29 mgd of canal water, available almost everywhere, could be filtered and used for irrigation much less expensively, and with less public apprehension.

Alternative 10, page v, is undoubtedly best for the long-range welfare of South County residents, as well as least costly to them, but it is also completely impractical. There is no indication whatsoever that much of the "unique agricultural lands" will not continue to be zoned for housing, at densities so high that individual septic systems will neither be safe nor practical. Moreover, it would result in the County abandoning its $20,000,000 investment in S. Palm Beach Utilities Co., which will happen the day after the second coming.

The latter problem rules out Alternatives 1, 3, 4, and 7, also.

Thus, only Alternative 6 and 8, pp. iv & v, really need be considered further. 8 must actually be considered as 8a, 8b, & 8c. These are
8a: enlarged existing plants with ponds for the western plants;
8b: enlarged existing plants with discharge through Boca Raton's outfall;
8c: "pumping all wastewater to the Glades Road Plant for treatment and disposal" sounds just like Alternative 1, but deferred until about 1988.

8c is out, like 1, since the County won't abandon its plant. 8b and 6 differ only in that 6 abandons the Pheasant Walk plant, while 8b retains it.

The remaining Alternatives, namely 6, 8a, and 8b, all leave no real choice but that Boca must expand its own treatment capacity from about 10 mgd to about 17 mgd, within a few years. Despite the hope of partial federal financing, it would probably end up to be most economical and expeditious if the City "goes it alone" on this effort, particularly because of the uncertainly of federal funding as to both amount and timing. It's most doubtful if the City can afford to wait scarcely at all, before starting engineering drawings.

In the absence of County iniatives to provide "implementability" as noted on pp. vii and viii, it just has to be Alternative 8a for the moment. After that, the increased use of Boca's outfall, namely, implementing Alternative 6 or 8b, should depend on whether the County will pay for outfall enlargement or "cushioning" with holding ponds if necessary, and pay a fee commensurate with the value of the outfall in reducing the cost of County treatment.

* * * * *

Col. Paul VanThielen, Second Vice-Chairman of the Federation, has pointed out that under some wheather conditions, and perhaps coupled with deficient plant operation, the outfall has a visible and odoriferous impact on nearby beaches.

* * * * *

Finally, Mr. F. A. Garrity, First Vice-Chairman of the Federation, poses the following additional questions:

An important statement occurs on page 33, Technical Reference Document II Alternatives Analysis, April 1980, "The conversion (Waste water treatment plants to waste water pump stations) will lessen the impacts of these facilities on surrounding land uses because the minimal amount of noise and odor that typically emanates from such facilities will be decreased as a result of conversion." Are we to assume that the collective noises and odors of the Sandalfoot Cove, American Homes-Century Village, and Pheasant Walk treatment plants would be concentrated at the City's Glades Road treatment plant which would of necessity be expanded to triple its current capacity and would in addition require two (2) eight million gallon raw sewage holding tanks? 5

No guarantee to the City of Boca Raton appears in any of the alternatives that "cost effectiveness" vital to the unincorporated areas unserved by the City's Waste Disposal System will not take precedence over Boca Raton's increasingly impacted esthetic qualities, odor-noise pollution, lessened property values and other local environmental qualities. Does such a guarantee exist or is one envisioned? Explain please.

The two (2) raw sewage holding tanks with a total capacity of 16 MG required for alternatives 1,2,3,4,7,9 & 10 and one (1) 6 MG required for alternatives 5 and 6 would occupy considerable space on the currently limited Glades Road plant property. Are provisions contemplated to acquire additional property in this area? At whose expense? How will the deleterious effect on surrounding property values from unattractive holding tanks and objectionable noise/odor problems be overcome? 6

Sludge disposal is already a serious and expensive problem, please outline the proposals for disposal of the increased volume and how said disposal will be financed. 7

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best available copy.

Since the proposed raw sewage force mains from the west of the turnpike are sized at 30" (Page II-22, E.I.S. Draft, September 1981) to handle the anticipated western flow, how can the 30" portion of the City's ocean outfall under the Intracoastal be expected to accomodate the western flow, the additional Pheasant Walk flow as well as the increasing demands from Boca Raton's current service area?

Most of the alternatives listed require the Boca Raton ocean outfall to
accomodate double or triple volume of treated effluent, what current or 8
anticipated plans have been made to protect marine life in the vicinity
of the end of the outfall and/or the possibility of pollution to Boca
Raton's beaches?

Sincerely yours,

John Gilroy

John Gilroy, Chairman
Water & Sewer Committee

JG/lhg

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City of Boca Raton

CITY HALL • 201 WEST PALMETTO PARK ROAD • BOCA RATON, FLORIDA 33432 • PHONE: (305) 395-1110

November 25, 1981

Mr. Robert Cooper
Environmental Protection Agency
Region IV
E.I.S. Division
345 Courtland Street, N.E.
Atlanta, Georgia 30308

Re: Draft "Environmental Impact Statement, Wastewater Facilities, Southern Region Area, Palm Beach County, Florida, September 1981"

Dear Mr. Cooper:

The following comments of the staff of Boca Raton concern typographical and geographical errors only. Many of the statistics on this "Draft" are from 1978 and 1979. Wherever possible, these statistics should be updated to available 1981 data. 9

Figure 1
- Very poor quality, can hardly read the street names
- Lake Rodgers should be LAKE ROGERS

Figure II-1 Legend for "Boca Raton Service Area" is missing the cross-hatching

Figure II-1 There are two Figure II-1 in this draft report. The second one should be Figure II-2

Page 1-1
Paragraph 2, line 7, preformed should be PERFORMED
Paragraph 2, line 9, comma after Boca Raton ,

Page III-1
Population - Paragraph 3, this information needs to be updated if possible

Page III-6
Paragraph 1 - update to 1981 the information regarding number of dwelling units
Paragraph 3 - last sentence - repeats information provided in last sentence of paragraph 1
Paragraph 4 - update 1978 housing prices to 1981 housing prices

Page III-9
Paragraph 5, sentences 2 and 3 should be eliminated as it refers to the dwelling unit limit that was declared illegal by the courts

— AN EQUAL OPPORTUNITY EMPLOYER —

Page III-10
Paragraph 1, update information regarding shopping center under construction. The Town Center has been completed.

Page III-13
Paragraph 4, update information regarding fire insurance rating

Page III-15
Paragraph 1, update information regarding number of sanitation workers

Page III-16
Taxes and Budgeting
Paragraph 2, update this information if possible

Figure III-9
- Very poor quality, can hardly read the letters
- $\boxed{\text{L}}$ is in wrong location - should be East of 441

Table III - 3 Summary of Selected Impacts
Hospital beds for 1980 is 1,047 but for the year 2000, it states 1,030, a 17 bed decrease. Is this an error?

Page III - 48
Last paragraph, first sentence, is an incomplete sentence

Page III - 55
Last paragraph, "Implementation" is spelled erroneously

Page V - 3
Citizens Review Committee should be updated to Environmental Review Committee and
Table V-11 refers to it as "EIS Review Committee". This inconsistency should be rectified.

Page V-6
Paragraph 4, sentence 2, "both by" should be "by both"

If you have any questions or need clarification on any of the above-referenced comments, please call me at (305) 393-7790.

Sincerely,

DEPARTMENT OF COMMUNITY DEVELOPMENT
Jesse W. Moore, Director

Vicky L. Newson

Vicky L. Newson
Project Planner/Coordinator

ENVIRONMENTAL IMPACT STATEMENT BRANCH
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vs

STATE OF FLORIDA
Office of the Governor
THE CAPITOL
TALLAHASSEE 32301

BOB GRAHAM
GOVERNOR

December 11, 1981

Mr. John E. Hagan, III, P.E.
Chief, EIS Branch
Environmental Protection Agency
Region IV
345 Courtland Street, Northeast
Atlanta, Georgia 30365

Dear Mr. Hagan:

In reference to your Draft Environmental Impact Statement related to Wastewater Facilities Southern Region Area, Palm Beach County, Florida, SAI #FL8110280534E, please be advised that of this date we have not received any substantive comments from the reviewing agencies. If we receive any comments from the agencies concerning this document we will advise you immediately.

Thank you very much.

Sincerely,

Walt O. Kolb

Walter O. Kolb
Sr. Governmental Analyst

WOK/jkc

cc: Mr. John Outland
Mr. Art Wilde
Mr. Louis Tesar
Mr. Dwynal Pettengill
Mr. Leonard Elzie
Mr. Brad Hartman
Mr. Hugh Boyter
Treasure Coast Regional Planning Council
South Florida Water Managment Dist.

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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 20, 1981

Mr. John E. Hagan, III, P.E.
Chief, EIS Branch
U.S. Environmental Protection Agency,
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: C120635010 (Step 1) - Boca Raton
South Palm Beach County - Environmental Impact Statement

Dear Mr. Hagan:

The Department of Environmental Regulation (DER) has reviewed and offers the following comments on the draft Environmental Impact Statement:

1. Selection of the modified Alternative 8 is justified. We agree with the U.S. Environmental Protection Agency's (EPA) stance of not funding facilities which would tend to promote rapid growth and development in environmentally sensitive areas, in areas of unique agricultural land, and in areas that would result in unacceptable stress being placed on other community services.

2. Land application should be encouraged on a cost-effective basis at all plants in the Southern Region as water conservation/recycling methods. Considering the water supply problems South Florida is experiencing, it 10 would appear prudent to find an appropriate means of recycling or reuse of this highly treated effluent; however, recycling or reuse may not be the most cost-effective means of disposal. If percolation ponds are shown not to be degrading the Biscayne Aquifer, then continued and additional usage of this effluent disposal method appears to be in line with the goals of recycling. The DER suggests that the community consider the possibility of developing a series of rapid infiltration ponds in lieu of the eight-million-gallon flow equalization tank in order to possibly reduce the surface water discharge while maximizing ground water recharge. Similar systems should also be considered at other plants if flow equalization becomes necessary as part of future effluent disposal alternatives. The rapid infiltration ponds could be designed as to also serve the purposes of a flow equalization basin. A monitoring program in accord with Chapter 17-6, Florida Administrative Code, (F.A.C.) will be necessary.

3. In order to lessen concern over implementability, a firm allocation of the Glades Road Ocean Outfall capacity should be obtained from Boca Raton. This 11 allocation should reserve capacity for the other plants in the Southern Region 201 Area to discharge effluent.

4. The coagulation-filtration-chlorination capability, as indicated, should provide the pathogen-free effluent required by Chapter 17-6, F.A.C., for application to areas of public access. This, or other processes of like capability, should be added to all treatment trains designed to supply effluent for spray irrigation on land with public access (golf courses, parks, etc.)

5. An investigation of the fate and movement of viruses after discharge to percolation ponds should be added to the EPA study of the effects of effluent on the Biscayne Aquifer (if not already included). Details such as placement of the monitoring wells, well depth and construction should also be included. The DER would appreciate receiving a copy of the specific details of the EPA sampling program when it becomes available.

Please do not hesitate to call David H. Scott at 904/488-2582 if you have any questions or desire further information.

Sincerely,

Richard W Smith

Richard W. Smith, P.E., Chief
Bureau of Wastewater Management and Grants

RWS/dsm
Enclosure (Chapter 17-6, F.A.C.)

cc: Robert Jourdan - EPA
David Peacock - EPA
James W. Zumwalt - City Manager/Boca Raton
Robert Ortiz - Camp, Dresser & McKee/Ft. Lauderdale
Walter Kolb - Governor's Office
John Outland - DER
Herbert H. Zebuth - DER/West Palm Beach

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Board of County Commissioners
Frank Foster, Chairman
Norman Gregory, Vice Chairman
Peggy B. Evatt
Dennis P. Koehler
Bill Bailey

County Administrator
John C. Sansbury

Department of Planning, Zoning, & Building
Robert E. Basehart
Director

November 19, 1981

Mr. John E. Hagan, III, P.E.
Chief, EIS Branch
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Hagan:

Planning Division staff have reviewed the Draft Environmental Impact Statement: Wastewater Facilities, Southern Region Area, Palm Beach County, Florida. I wish to thank the consultant and members of your staff for their efforts concerning the development of the draft EIS. In light of the public hearing and request for comments, I believe that this is an appropriate time to reiterate certain concerns of Palm Beach County for the preservation of unique agricultural lands and to update you in relation to the adoption of the Palm Beach County Comprehensive Plan. Our concerns for sections of Chapter III have been long standing as cited in the attached letter to Mr. Bob Cooper of January 15, 1981, dealing with the draft procedures to impliment the EPA Policy to Protect Environmentally Significant Agricultural Lands.

As had been expressed previously, the concern of Palm Beach County is to establish "preservable" unique agricultural lands in a manner similar to the outline in Chapter III-56. Subsequent to the drafting of Figure III-2, Palm Beach County did adopt the Comprehensive Plan that instituted a program for the preservation of unique agricultural land north of Clint Moore Road and west of the Loggers Run Planned Unit Development west of Florida's Turnpike. This program is currently being implemented through the adoption of zoning Code amendments to provide for the Transfer of Development Rights and the Agricultural Preservation District. These ordinances were adopted by the Board of County Commissioners on November 10, 1981, and draft copies are attached for your information.

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I would suggest that the Draft EIS, particularly portions of Chapter III, be revised to reflect the July 22, 1980, adoption of the Comprehensive Plan, the implementation of the agricultural preservation program and the participation of Palm Beach County in the United States Soil Conservation Service, "Agricultural Land Evaluation and Viability Assessment System". The latter item is currently being organized as documented in the attached 208 Responsiveness Summary Form. Page 3 summarizes the program and its relationship to the South-Central Region 201 Facilities Plan. I am enclosing this to indicate that the Southern Region is not the only area of Palm Beach County where the concern for preservation of unique agricultural lands exists. As the system details are formulated with the Soil Conservation Service, I will be most happy to provide greater information.

Sincerely,

Harry W. King

Harry W. King
Principal Planner

HWK:cjs

Encl.

cc: Stan Redick
Bob Basehart
Don Lockhart
Jim Fleishman, APB
Vicky Newson, Boca Raton

ENVIRONMENTAL IMPACT STATEMENT
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DRAFT EIS PUBLIC HEARING
November 17, 1981
City Council Chambers
Boca Raton, Florida
7:30 o'clock P.M.

APPEARANCES:

PAUL TRAINA
ROBERT COOPER
HERB ZEBUTH

ALSO PRESENT:

GRACE JOHNSON
PAUL R. VAN THIELEN
JOHN GILROY
AUGUST H. MALTSON
ROBERT ORTIZ
JAMES STALLINGS

Taken before JOAN COMPARATO, a Shorthand Reporter and Notary Public in and for the State of Florida at Large.

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Thereupon:

The following proceedings were held:

MR. TRAINA: I call the hearing to order, please. Good evening. I would like to welcomeall of you to the public hearing on the draft environmental impact statement on proposed wastewater facilities for the City of Boca Raton and surrounding areas of Palm Beach County, Florida.

First, let me introduce the panel here. I'm Paul Traina, Director of the Water Management Division for the United States Environmental Protection Agency in Atlanta, Georgia. On my right is Mr. Herb Zebuth, who is with the West Palm Beach County District Office of the Florida Department of Environment Regulation, and on my left is Mr. Robert Cooper, who is the USEPA in Atlanta and he is the project officer for the EIS.

The purpose of this evening's hearing is to receive public and other agencies comments on the wastewater management proposal contained in the draft environmental impact statement for the Southern Region of Palm Beach County, Florida.

Let me say that we have an extensive summary of that statement, together with the actual draft report, which is the blue bound copy. This EIS is being prepared on wastewater facilities on the 201 facilities plan prepared for the City of Boca Raton and Palm Beach County, Florida by Camp, Dresser and McKee, Fort Lauderdale, Florida.

The preparation of this EIS is authorized by the Clean Water Act and the National Environmental Policy Act. The Clean Water Act enables EPA to fund up to seventy-five percent of the eligible cost of the planning, design, and construction of wastewater facilities.

The planning phase of this process results in preparation of a facility plan. In this instance the City of Boca Raton has been designated as the local agency responsible for facility planning in this area.

The National Environmental Policy Act requires federal agencies to prepare an environmental impact statement on major federal actions significantly affecting the quality of human environment.

Because of the environment complexities of the water quality issues involved, EPA made the decision to prepare an environmental impact statement on the 201 facility plan.

Accordingly, in September of 1978 the notice

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of intent to prepare an EIS was issued. Pursuant to the guidelines of the President's Council on Environmental Quality and the rules and regulations of the EPA, with regard to the regulations of the EIS's. This public hearing is being held to receive comments on the draft EIS. The draft EIS on the facility plans is being discussed in a public forum to encourage public participation in the federal decision-making process and to develop a true public understanding of the federally funded projects.

In this regard, the draft document was made available to the public and EPA's Office of Federal Activities on -- That's in Washington, on September 17th, 1981, and it was listed in the Federal Register on September 25th, 1981.

The draft EIS comment period will be extended until November 30th, 1981. The comments received during this evening and during the comment period will become part of the record.

Before we receive testimony from the public, I would like now to call on Mr. Robert Cooper, who will provide us with a brief summary of the project.

MR. COOPER: Thank you, Paul.

As Mr. Traina said, I am the EPA, EIS project manager for this project. What I would like to do is

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go over the alternatives which were developed by the 201 consultant, who is Camp, Dresser and McKee out of Fort Lauderdale, Florida, and by the EIS consultant, who was Stattler, Stagg and Associates out of Orlando, Florida, who helped us with this project.

Before I go into the alternatives, I would like to briefly say that the City of Boca Raton currently operates the Glades Road wastewater facility, which has a current capacity of ten million gallons per day providing secondary treatment with discharge by ocean outfall. Palm Beach County now operates three small treatment facilities with discharge in percolation ponds. The County recently purchased the South Palm Beach Utility Corporation, which had been operating in that area. Starting on page three of your handouts, there is a list of the alternatives for wastewater treatment and disposal which were evaluated in this 201 EIS process. Briefly I will go over them.

The first three alternatives are all one plant alternatives serving the entire planning area of the City and the County, which has a total capacity -- Which would have a capacity of twenty-nine million gallons per day, if it was all sewered.

Alternatives for disposal involve combinations of the ocean outfall and spray irrigation. Additionally, concepts consisting of two and three regional plants are also considered along with deep well injection and spray irrigation, along with the existing ocean outfall.

Also, the no Federal action alternative involving both the City and the County, and just the County were also evaluated.

Specific environmental concerns which were looked at in our selection process include the presence of unique agricultural lands throughout the County portion of the planning area and also the presence of the designation of the Biscayne aquifer as the sole source of drinking water.

Following the cost and environmental evaluation of these alternatives, which is described later on in your handout, EPA selected a modified no action as the preferred alternative for the EIS. This alternative involves the recommendations of federal funding for the expansions of the Glades Road facility to 17.5 gallons per day to serve sub-basin A, which is the City's current service area.

EPA would not fund any expansion into the county portion of the planning area. Capacity currently exists at Sandalfoot Cove, American Homes and Pheasant Walk Plants to last until 1990. These plants are the ones in the County service area. These plants could then be expanded to six MGD each at Sandalfoot and American Homes and .7 MGD at Pheasant Walk with a discharge to either percolation ponds or the City's ocean outfall by the County, with one hundred percent local funding, if they so desire.

The third alternative for the County would be pumping all wastewater to the Glades Road plant for treatment and disposal. Any agreement on any of those alternatives would have to be before any of these alternatives could be undertaken and an agreement would have to be reached between the City and the County.

The underlying theme of the EIS is a selection of the wastewater management program for this region. It is compatible with the protection of the area's sensitive resources, particularly the Biscayne Aquifer and the unique agricultural land, while recognizing the existing extensive development pressures.

In light of the projected impact of the growth and development and especially with the demonstrated lack of existing water quality problems, EPA selected the modified no action approach described above as the preferred alternative. It is hoped that local land use policy will -- Which is -- Which will affect the protection of the sensitive resources much more than this decision here, will be geared with the protection of those resources in mind for the foreseeable future.

MR. TRAINA: Thank you, Mr. Cooper.
I would like to ask Mr. Zebuth, representing the State, if he has any comments to make.

MR. ZEBUTH: I have some comments here that are a combination of our district and Tallahassee office input.

The Department of Environmental Regulation offers the following comments on the draft and environmental impact statement: Selection of a modified alternate eight is justified. We agree with the United States Environmental Agency's stand or not funding a facility which would tend to promote rapid growth and development in environmentally sensitive areas, in the areas of unique agricultural land and in the areas that would result in stress being placed on other community services.

The land application should be encouraged at all plants in the southern region as a wastewater conservation recycling method.

Considering the water supply problem South Florida is experiencing, it would appear prudent to find an appropriate means of recycling or reuse of this highly treated effluent. Recycling or reuse may not be the most cost effective means of disposal. However, communities must weigh the value of these resources against factors other than solely a monetary one. Percolation ponds shall not be degrading to the Biscayne Aguifer and continued and additional effluent disposal method appears to be in line with the goals of recycling.

The continued monitoring program in accordance with Chapter 176, Florida Administrative Code will be necessary. We had asked that the community consider the possibility of developing a series of rapid infiltration ponds in lieu of eight million gallons pro equalization tanks with an eye towards recycling surface waters discharge while maximizing ground level recharge.

Sewer systems should also be considered at all other plants if full equalization becomes necessary as part of the future effluent disposal alternatives.

Rapid infiltration ponds may be designed as to also serve the purpose of a flow equalization basin. In other to lessen concern over implementability a firm allocation of the Glades Road ocean outfall capacity should be obtained from Boca Raton. This allocation should reserve capacity for the other plants in the southern region, the 201 area to a discharge effluent during wet weather and emergency conditions as a backup to their land operation percolation pond method.

The coagulation infiltration chlorination capability as indicated should provide the virus-free effluent required by Statue 176 of the Florida Administrative Code of the applications in areas of public access.

These or other processes of like capability shoulder be added to all treatment plants designed to supply effluent for spray irrigation on land with public access, such a golf course, parks, et cetera.

And investigation of the fate and movement of viruses after discharge to percolation pond should be added to the EPA study of the effects of the effluent on the Biscayne Aquifer, if not already included. Details such as placing of monitoring wells, well depth and construction should also be included.

The DER would appreciate receiving a copy of specific details of the EPA's program when it becomes available. Thank you.

MR. TRAINA: Thank you, sir.

At this point, I turn it over to all of you out there and I will ask, as I call your name, if you will come up and identify yourself.

I think there is a speaker that you can speak from, so you can get into the P.A. system.

Give us your name and if you represent anyone who you represent, and I will ask if you have not already, please sign -- Fill out the yellow card.

Mis Johnson is here to receive those cards. That will tell our bosses when we get back to our offices in Atlanta, that someone in fact did come and we have a record of those people. It will also give you a chance to get on our mailing list to receive information. We are, as you can see, transcribing the hearing, so if you do have a -- If you have an extra copy of what you're going to say, I'm sure the court reporter, Miss Comparato, would be happy to receive that.

So, with that, let me ask you Mr. Paul Van Thielen, to come, please.

MR. VAN THEILEN: My name is Paul Van Thielen and I reside at 7071 Northeast 6th Street. That's about a quarter of a mile from the ocean and I am President Emeritus of the Riviera Civic Association, which extends from Palmetto Park Road north for about a mile and a half along the ocean and along the New Shine Track (phonetic) to Riviera Beach.

In the past when the choppers of the Glades Road plant were not operating properly and the Gulf Stream was out further east, we've had numerous occasions when we had deposits on the beach and vile odors 12 which indicate that the present outfall, the length of the present outfall is marginal and it appears that any additional use of the outfall would result in a rather hazardous condition, and what I'm afraid of, there be no recognition made to extend the outfall to accommodate additional flow.

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From studies in the past indicated that extending the outfall by a quarter to three eighths of a mile, which we require for any additional use, even by Boca Raton, and the uses that are prepared here for the entire area certainly indicate that the three eighths of a mile extensive outfall further into the Gulf Stream to accommodate the variances of the flow of the Gulf Stream going north is definitely required. Thank you.

MR. TRAINA: Thank you very much, sir.

Mr. John Gilroy.

MR. GILROY: John Gilroy. 1052 Southwest 12th Terrace, Boca Raton.

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I'm speaking tonight as chairman of the Water and Sewer Committee of the Federation of the Boca Raton Homeowner's Association, which is an association made up of individual homeowners' associations, for the number of about twenty-one and in fact includes most of the active homeowner groups within the city. Their membership in turn gives it contact with approximately half of the population of the city.

I'm sorry that we're not prepared with written comments tonight. I will -- The date caught up with us accidentally, so to speak, and we were preoccupied with other matters. I will endeavor to have more carefully considered written comments within your hands within the time of consideration.

Meanwhile, I think our general pattern is fairly clear.

Alternatives two, five and seven are essentially impractical because of the cost compared to the limited benefits. Since -- Since useful water is such -- These are the alternatives that call for treating wastewater, finally, and using it for irrigation. Useful water from this direction is such a trivial fraction of rainfall in the area, that I don't think it's worthwhile and the maximum available is something in the region, presumably of twenty-nine million gallons a day and twenty-nine million gallons a day of canal water could be filtered and used for irrigation much less expensively and with considerable human cry, I think.

So, I think those alternatives essentially disappear from reality. Alternative ten, the handling of the effluent from a single plant and not including the agricultural land, I think is undoubtedly the best for the long range welfare of south County residents, as well as the least costly to them, but I'm afraid it is also completely impractical.

There is no indication whatsoever that much of the quote unique agricultural land unquote will not be zoned for housing at densities so high that individual septic systems will be safe or practical. As it is going, that land is going to have to be sewered as best as we can see it would be much better, if such was not the case for everyone involved.

There will be water problems as well as sewer problems and traffic problems and everything else, but it is coming. Moreover, it would result in the company abandoning its twenty million dollar investment in the South Palm Beach Utilities Company and that will happen the day after the second coming. The same problem of abandonment of an extensive facility, which I think is really improbable really rules out alternatives one, three, seven, and really also alternative four. All of these -- In visualizing abandoning facilities, comparable to cost and I don't think there is any possibility it will happen.

So, really only alternatives six and 8-A and 8-B really need to be considered. Now, eight is really three alternatives since there are variations in there and I'm going, for instance, to call 8-A the existing plants with ponds for the western plants; 8-B the existing plants with discharge through the City's outfall and 8-C, quoting "pumping all wastewater to the Glades Road plan for treatment and disposal."

I think 8-C is just like alternative one, to the best I interpret the language there, but deferring alternative one until about 1988 rather than adopting it as a policy now, and 8-B, that is putting the discharge to the City's outfall and alternative six differs only in that six abandons the Pheasant Walk plant while 8-B retains it.

Now, both six and 8-A, which I think are the only possibilities really that have any prospect of a choice, call for the City to expand its own treatment capacity from about ten million gallons a day to about seventeen million gallons a day, and dispute the possibility of the federal financing on a regional basis, it will probably end up to be the most economical and expeditious, if the City goes along on this effect, particularly because of the uncertainty of the federal funding, as to both of the amount and time.

The consultants to the City indicate that it's doubtful if the City can really afford to wait at all without running into problems of insufficient capacity before new construction can be on line.

So, I feel that it just has to be what I've called alternative 8-A for the moment; that is, to say the use of ponds with the western plants and an expansion of the City plant with or without federal funds and perhaps because of the time element.

After that, the use of the outfall, the alternative six or 8-B, I think should depend on whether the County will pay for an enlargement or cushioning of holding ponds if necessary to enable the outfall to take care of loads since that is a doubtful matter at the present time.

I think if the outfall is to be used for the entire area and if the County is willing to pay a fee commensurate with the value of the outfall in

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reducing the cost of the County treatment -- Now, it probably sounds as if I'm somewhat pessimistic about the County's cooperation and I think there is some reason for that.

As far as I'm aware, the County has not proposed to enter into or consider seriously any of these alternatives. The City has had rather -- I would say I will call it an unfortunate experience with the County environmental impact problems in the Palmetto Park pretzel, which was a terrible traffic mess, which was generated despite the protest of Boca Raton citizens by the County engineer and we have another one of a similar nature, where the environmental impact is bad, I think, and a good many of the residents to think, on the Dixie Highway.

Instead of widening the streets alongside the railroad tracks, they chose to widen it over some people's front yards and leave a strip of essentially miserable territory between the widened road and the railroad tracks. So, as I say, there is, I think, considerable reason to be unhappy with the prospect of excellent county cooperation.

Again, the City has, as you probably are aware, lead this area of the countryside in attempting to bring in sensible planning, particularly so far as density of housing, which again has an enormous impact on the water and sewerage requirements. The County has gone the other way, even if specific instances where the City has recommended otherwise. I also have a memo from Mr. Garrity, who is a member of our committee, and is a vice-chairman of the Federation of the Boca Raton Homeowners, who could not be here this evening. It is not too long and I will read that. We would -- We would reconsider this and put it in the record subsequently or a version of it.

An important statement occurs on page thirty-three, technical reference document two, Alternatives Analysis, April 1980. "The conversation that is from wastewater treatment plants to wastewater pump stations will lessen the impact of these facilities on surrounding land uses because of the minimal amount of noise and odor that typically emanates from such facilities will be decreased as a result of the conversion."

Are we to assume that the collective noises and odor of Sandalfoot Cove, Century Village, Pheasant Walk treatment plants would be concentrated at the City's Glades Road treatment plant, which of necessity would be expanded to triple its current capacity and would in addition require two eight million gallons raw sewage holding tanks?

No guarantee to the City of Boca Raton appears in any of the alternatives that cost effectiveness vital to the unincorporated areas unserved by the City's waste disposal system will not take precedence over Boca Raton's increasingly impacted aesthetic quality, odor, noise pollution, lessened property value and other local environmental qualities. Does such a guarantee exist?

The two raw sewage holding tanks with a total capacity of sixteen million gallons required for alternative one, two, three, four, seven, nine, and ten and sixteen and a half million gallons required for alternatime five, and six would occupy considerable space on the currently limited Glades Road plant property. Our provisions contemplate to acquire additional property in this area or double with the others, and who expense, how it will affect surrounding property value from unattractive holding tanks and objectional noise and odor problem be overcome. The sludge disposal is already an expensive problem. Please outline the proposals for disposal for increase volume and how that disposal would be financed.

We have just been faced from the City with an enormous cost of disposal -- Cost increase, excuse me.

Since the proposed raw sewage force mains from the west of the turnpike are sized at thirty inches to handle the anticipated western flow, how can the thirty inch portion of the City's outfall under the Intracoastal be expected to accommodate the western flow, the additional Pheasant Walk flow, as well as the increased demand in the Boca Raton current service area?

Most of the alternatives listed require that Boca Raton -- Ocean outfall to accommodate, double, or triple volume or drug treated effluent. What current or anticipated plans have been made to protect marine life in the vicinity of the end of the outfall and the possibility of pollution to Boca Raton beaches?

Outlined in the opinion of some residents, their eyes and noses tell them that this problem still exist, although its really not gone into, I think rather properly so, because apparently there was no adequate record of this available to you folks.

Finally, alternative 8 the no federal action quote alternative indicates only local city, county -- City or county funds would be available to expand existing facilities. Under what circumstances would there be an advantage to the City in this arrangement over Boca Raton's continued sole operation of this current service area, since the County would apparently finance only that portion of the expanded City that would connect to the City's ocean fall -- Ocean outfall, excuse me?

This is again from Mr. Garrity. Thank you for your patience and I will be free to answer any questions.

MR. TRAINA: If you will give us those comments in writing -- They will be in the record, but included in the EIS with appropriate responses, and I would secondly ask you, I assume that the home builders' association that you represent includes only those home builders in the City of Boca?

MR. GILROY: It's the homeowners.

MR. TRAINA: I think you answered the second question.

MR. GILROY: I don't think our contact with the others outside of the City is very limited. They do not have a federation corresponding to ours, so as far as I know, their homeowners' association outside of the City have no specific way of exchanging viewpoints and so far have just not been -- I don't know, had the extensive background that ours had. We have been at it about fifteen years.

MR. TRAINA: If I can make a suggestion, if you can possibly tap those homeowners in the County, because we're very much concerned, as I think we wish to share your concern with, regarding this encroachment question and we realize that our decision will only affect federally financed projects and does not preclude the County or the City from doing whatever they want with local funds.

MR. GILROY: I happen to be the president of the Citizens for Reasonable Growth, which again, is a City organization only; which is -- Stress the necessity of low density housing as compared to the old plan for this City, which called for extensive areas of fifty or eighty per acre and that organization also has made recommendations that the City should go its own direction, so, within the City, I'm quite sure that this feeling is very widespread.

Outside of the City, I don't know.

MR. TRAINA: Well, Mr. Gilroy, for the moment I thought you were representing the home builders.

MR. GILROY: No.

MR. TRAINA: But, I do thank you for coming.

MR. GILROY: Thank you.

MR. TRAINA: That concludes the individuals that indicated they wanted to talk. I would like to ask you, is there anyone else, having heard what they have said that wish to come up and identify yourselves and who you represent?

MR. MALTSON: My name is August Maltson. I have at 570 Northeast Golden Harbor Drive. I represent myself, even though I am a member of the Water and Sewage Committee of the Federation.

On page five -- Roman numeral five, under alternative eight, the last -- The tail end of that paragraph, "A third alternative for the County would be pumping all wastewater to the Glades Road plant for treatment and disposal."

I think we have to have a definition of what the -- What you mean by wastewater and what you mean by treatment, because if we are thinking about wastewater coming through the outfall, it's already been treated, so that paragraph or that sentence there needs some explanation, in my opinion.

Then, I'm also a member of the EIS committee, and the thing I'm interested in is the big switch that we have had from -- Everyone was selling alternative one until the last meeting and it's been a long time since we had any meeting on the EIS committee.

I notice that Stattler and Stagg is not even represented here and I see our friend, Mr. Ortiz, over here from the engineering group, but everyone was for alternative one and there was only a small group that was against alternative one and for alternative eight.

What caused the switch?

MR. TRAINA: I don't know what did it, but I guess you've won.

MR. MALTSON: I mean, why did everyone -- Because it -- Because of Reagan's economic program? Everyone switched and then the other thing --

MR. TRAINA: If you're going to get me to say I would rather fight than switch, forget it.

MR. MALTSON: On the original alternative eight, there would be no funding. Now, we have alternative eight being recommended with funding. What is the chance of getting the funding? Is that something that is just on a piece of paper or what is the reality?

MR. TRAINA: I will ask Mr. Cooper if he would like to comment on your first question and then I can address the funding question for you.

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MR. COOPER: Okay. About switching, EPA never favored at the time you're talking about, alternative one or any alternative. There may have been some people involved in the process as it went along favored one alternative or another one. We don't make our decision until all of the alternative analysis, the costs, the environmental analysis is all completed.

So, I don't believe -- I don't know what impression I gave you or anyone else from EPA gave you, but we didn't change our minds because we didn't make our minds up.

MR. MALTSON: I'm not talking about EPA. I'm talking about the consulting engineer and Stattler and Stagg. They were all selling alternative one strongly all along and all of a sudden we don't even hear from them.

MR. TRAINA: Let me suggest that that would be a subject of discussion after the hearing.

The results are indicated that the agency has made its determination that it's alternative number eight.

MR. COOPER: Let me say one thing about your question about treatment and disposal. In selecting no action for the County portion of the area, we are -- Our decision is that we are not recommending providing federal funding. The rest of these discussions are possibilities for the County to use for treatment and disposal, if they continue their growth policy, which would mean extensive growth and development in the area with an extended need for treatment and --

MR. MALTSON: What do you mean?

MR. COOPER: The things we mentioned here are the expansion of the plants out there or -- Or taking it or treating it out there and taking it to the outfall for disposal or taking it to the Glades Road treatment plant and then disposal through the outfall.

These are all alternatives that would have to be worked out between the City and the County, since it would be all local funding.

MR. MALTSON: So, actually that means that the suggestion that the City of Boca Raton at the Glades Road plant would actually treat the effluent from the areas of Pheasant Walk and the areas west of the turnpike?

Is that what that sentence means?

MR. COOPER: That is saying it's a possibility, but again, we're not -- we're recommending.

MR. MALTSON: It's an alternative, but is that what that language means?

MR. COOPER: Yes.

MR. MALTSON: Actually treat it?

MR. COOPER: Yes.

MR. MALTSON: How would they treat it?

MR. COOPER: The same process they're using to treat it now.

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MR. MALTSON: How would all the solids be -- The solids would be removed out west then?

MR. COOPER: No, not if it's treated at Glades Road.

MR. MALTSON: It says wastewater. You're not talking about -- You're talking of the wastewater meaning total sewage?

MR. COOPER: Right.

MR. VAN THIELEN: If this is alternative one, we're getting into effect in 1988 instead of now.

MR. COOPER: Right, but with total local funding. It would be an agreement between the City and the County.

MR. MALTSON: So, it would be total sewage and not wastewater? Wastewater is something that is -- That's the effluent? If wastewater is total sewage --

MR. COOPER: Right.

MR. MALTSON: I didn't read it that way. Well, that, of course would -- As far as I'm concerned, that would be absolutely out.

MR. COOPER: Again, what the EIS is saying is that our preferred alternative is to provide federal funds for expansion of the Glades Road plant for the City service area and we're recommending no federal funding for the County portion of the service area.

That is EPA's decision. Anything beyond that is a local decision.

MR. MALTSON: It's agreement. Thank you kindly.

MR. TRAINA: Thank you, sir. Any other comments? Would anyone like to get back up and re-comment?

MR. GILROY: May I ask --

MR. TRAINA: For the benefit of the young woman here, we would appreciate you getting up.

MR. GILROY: I am troubled with a question. I don't see a County representative here and as I say, the record, as far as I'm aware, indicates they have not shown any -- What shall we say, any urgent desire to participate.

Is that impression valid or is there more than meets the eye?

MR. TRAINA: I don't know. I can't make any comments on that. I would like to -- Yes, I mentioned I would comment back to you about the funding question you had asked, Mr. Maltson:

You asked about federal funding. Let me just reiterate what Mr. Cooper said and that is what the whole process, what they're concluding here, shortly after we go through this public hearing.

they're only affecting the federal government's decision for funding and tentatively we determined that there would be federal funds only available for the expansion of the City's plant and none of that would go to the expansion of the County, a part of that.

What is done beyond that between the City and the County is outside the purview of the federal government. Whatever you all at the City or County level decide to do, you just go ahead and do it. We're going to say what we pay for, what we're going to pay for.

Now, with regards to the funding picture, as I'm sure you all know, things are a bit different and considerable changes with regard to the construction program of EPA and that's the program that we're talking about funding, and as of now, the amount of funds that have been composed by the administration are considerably less, approximately half than in the past. We have been up at the national levels of operating at a five billion dollar a year program and now the administration is talking about cutting it to two point four billion, so there would be fifty percent less money available. Complicating that, the administration has proposed changing allocation of the monies to different states and it would be based more on the existing needs, rather than future. So, a state like Florida would get less money because most of Florida's needs are projected needs.

So, the funding picture generally is going to be less and particularly in Florida it's going to be less. How that relates to Boca Raton depends on how the State views Boca Raton's priorities, its own needs and that is the State's determination.

EPA does not get involved in that. The State decides which communities are going to have the higher priority.

MR. MALTSON: My question was in two parts. The first part was the original alternative eight had no funding and then now it's suggestive that it be funded. So, why did we change our minds and secondly, you answered the second part, but you didn't answer the first part.

MR. COOPER: We felt it was appropriate when we got into the decision-making process to divide the decision on federal funding.

Instead of looking at the whole 201 area, to look at the City service area, and County service area separately and make separate decisions. That's how that came about.

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MR. TRAINA: Any other comments?

MR. GILROY: Would you folks at all care to comment on this time element as I mentioned? The City's consulting engineer, even though the City is not anywhere near as yet utilizing the full capacity of its treatment facilities, have recommended that either re-permitting and revision -- Have recommended specifically that the revisions be undertaken very promptly and additional capacity constructed in the rather near future and expressed arrangements can be made for review and financial participation by the EPA in time for meeting the needs.

If I'm not stating it correctly, please correct me, or what comments --

MR. TRAINA: Bob?

MR. ORTIZ: My name is Bob Ortiz and I'm with Camp, Dresser and McKee. He is correct to a certain point and by that, I mean that the plant would reach capacity a lot quicker if you started bringing in areas to the west. We have done some projections at the plant, the Glades Road plant, if it treats just the City service area to reach its capacity of ten sometime in 1985. It's presently seventy-five percent capacity, by the way.

So, if you back off it usually takes about three years to construct a facility. You're talking about

1982 bidding a project. You know, it's 1981, so its planning ahead it what --

MR. GILROY: No one has the drawing.

MR. ORTIZ: That would be needed to be done. It usually takes six months. That's the rationale that we use.

MR. TRAINA: Thank you, Mr. Ortiz.

MR. VAN THIELEN: Only five percent of the City on septic tanks.

MR. TRAINA: Do you care to make a statement for the record, sir?

MR. GILROY: My question basically remains, is there time for the City to well, let's say, cooperation and such with the arrangements for a funding by EPA, assuming it's available and so on?

MR. ORTIZ: I don't know if I can answer that. I would say there is time, but I think you're running out of it pretty quickly. I think we have to get moving to implement improvements, so you don't run out of capacity. I think -- Just to further that question, I think the City has taken steps to see what interim improvements can be made if there is a possibility; that is if you start running out of capacity -- I think people within the City are looking ahead.

MR. MALTSON: Let's not pull the thing we did on the water. You're not going to say "Don't use the john"?

MR. BEBUTH: Do you have a feeling that you shouldn't say anything?

MR. TRAINA: That happens all the time, but that doesn't stop me.

MR. ZEBUTH: That's a lot of questions about funding and I hate for people to get their hopes up when things don't look all that encouraging.

The State has a priority system that they use to rate the various requests from the communities around the State.

It's complicated, but involves such things as the river basin, in which the community is located, the amount of pollution that exists, the amount of pollution that is being contributed by the facility that is collecting the funds, the population in that area and there are a lot of cities in this state requesting funds for a lot of different projects and I wouldn't -- I would say the prospect of getting money to do that before 1982 is out would appear extremely dim concerning all of the situations that exist around the state and as it exists here. That doesn't mean that obviously that an attempt should not be made, but we have to look at it realistically.

MR. GILROY: Thank you.

MR. TRAINA: Okay. As I have said earlier, we will keep the record open until the 30th of November and ask that you send us any written comments involving those questions that we had. We would ask you to address those to Mr. John E. Hagan. He is the Acting Chief of the Environmental Assessment Branch. EPA Region Four, 345 Courtland Street, Atlanta, Georgia 30365, and I notice that the address is on the bottom of the handout that you have. I want to thank you all for coming this evening, for giving us the benefit of your comments. We certainly will consider them, as I say, they will be put into the Final EIS with group responses and that Final EIS will consist of the agency's final decision, a summary of the draft EIS, any pertinent and additional developments of the draft revision, comments, and the EPA's responses to the transcript of this hearing.

Those of you who have come tonight and filled out the little yellow card will receive a copy of the Final EIS when it is published.

Again, we want to thank you for your participation and your coming this evening and this hearing is now adjourned.

CERTIFICATE OF NOTARY

STATE OF FLORIDA)
: SS.
COUNTY OF BROWARD)

I, JOAN COMPARATO, a Shorthand Reporter and Notary Public, do hereby certify that a hearing of the U.S. Environmental Protection Agency was held at the City Council Chambers, Boca Raton, Florida, on the 17th day of November, 1981; that I was authorized to and did report in shorthand the proceedings of said hearing; and that the foregoing pages, numbered from 1 to and including 34, represent a true and correct transcription of my shorthand report of said meeting.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this day of December, 1981.

Shorthand Reporter
and
Notary Public

My Commission expires: January 24, 1983

Part F: Responses to Comments

Response 1

As this comment letter indicates, limestone, sand, and gravel resources occur near the proposed facility. It is not expected that the implementation of this project will impact these resources in any way. The continued urban development which will occur in the project area may eventually impinge upon some of these mineral resource areas. Local land use and development policy will most significantly effect how this issue is resolved.

Response 2

The precautions recommended in this letter will be taken if the need arises. Please refer to the comment letter from the Florida Department of State to document our coordination to date with the Florida State Historic Preservation Officer.

Response 3

The results of the EPA sampling program is presented in Appendix A of this Final EIS. The Florida Department of Environmental Regulation will continue their on-going monitoring efforts of groundwater near the percolation ponds. This monitoring effort should identify any increases in nitrate levels which might occur. The results of the most recent monitoring reports are presented in the Draft EIS.

Response 4

Since no Federal funding is recommended for the unique agricultural lands in the area, the project does conform to the Council on Environmental Quality's and the Department of Agriculture's joint memorandum of August 30, 1976, concerning the effect of the project on prime and unique farmland.

Response 5

Appropriate design coupled with effective operation and maintenance will mitigate against any excessive noise and odors which might otherwise occur. The residents surrounding the Glades Road Treatment Plant should experience no significant increase in noise and odor as a result of plant expansion.

Response 6

The City currently owns enough land at the Glades Road facility to provide service to the entire planning area through the year 2000. Additional land would be needed at some point beyond 2000.

Response 7

A discussion of appropriate sludge disposal techniques is presented in Section I of Chapter II .

Response 8

The ocean outfall can accommodate all of the anticipated flow for the entire planning area through the year 2000. It is not anticipated that these flows would cause any severe adverse impact to water quality. The 201 consultant is now evaluating the possibility of adjusting the angle of the outfall to lessen possible surfacing of material from the outfall.

Response 9

The errata comments from the City of Boca Raton have been responded to throughout the text, where appropriate.

Response 10

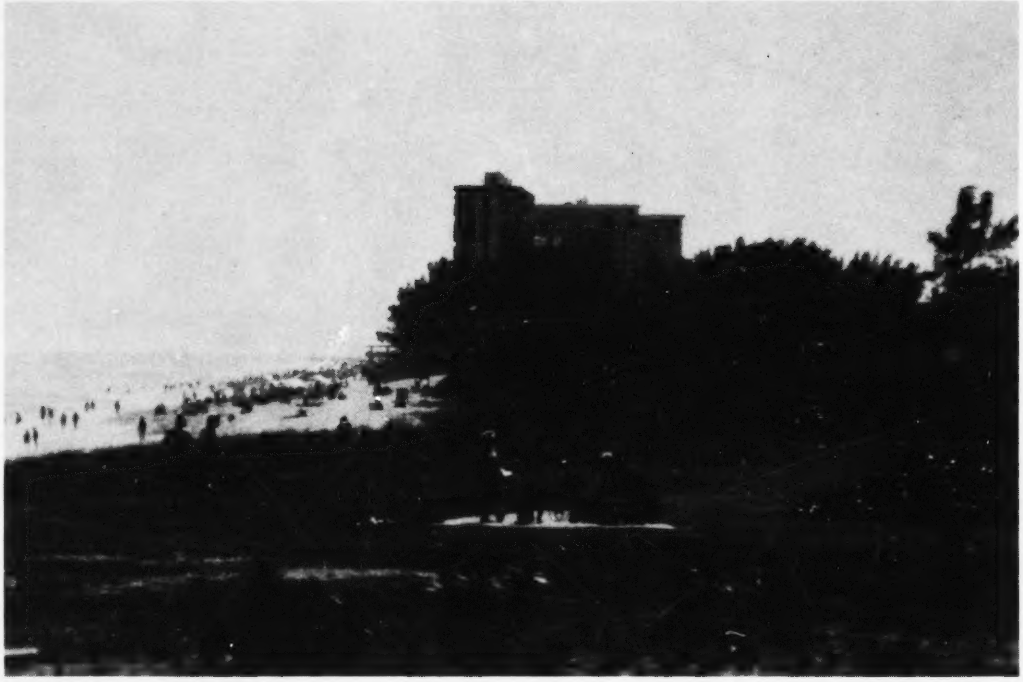
At the request of Florida DER, the 201 consultant has evaluated the possibility of developing a series of rapid infiltration ponds in lieu of the eight MGD flow equalization tank in order to possibly reduce the surface water discharge while maximizing groundwater recharge. Land is currently not available at the Glade Road site for this purpose. Additional land purchases for this purpose would be very expensive and would forclose options for treatment of flow from the Palm Beach County area at a later date.

Response 11

EPA concurs that maximum flexibility for planning treatment and disposal of future flows should be maintained. It is up to the City and County to come to any agreements on this matter.

Response 12

No increase in the length of the outfall will be necessary to maintain water quality conditions.



CHAPTER VII - LIST OF PREPARERS

Project Personnel

U.S. Environmental Protection Agency

Robert B. Howard	Chief, NEPA Compliance Section
Robert C. Cooper	EIS Project Officer
Karen L. Tasner	Editor/Secretary
Virginia W. Buff	201 Planning Project Engineer
Linda A. Clemens	Groundwater Project Officer

Consultants

Stottler Stagg and Associates

Roy F. Cowell	Project Manager
Carl Gosline	Deputy Project Manager
E. J. Kazmerczak	Deputy Project Manager
James Nicholas	Economist
Milledge and Hermeley	Attorneys
Coastal Zone Resources	Biologists

Camp Dresser and McKee

Phil Moses	Senior Vice President
Robert Ortiz	Project Manager
Dan Anderson	Project Engineer

1.0 PROJECT DESCRIPTION

The Palm Beach County Environmental Impact Statement Sampling Program (PBC Sampling Program) is a supplemental study designed to provide background information on existing groundwater quality and treatment plant effluent quality in the study area. The program is short term in nature and provides data on a one-time sampling basis.

1.1 Introduction

In September 1981 the U. S. Environmental Protection Agency issued a Draft Environmental Impact Statement (DEIS) for the Southern Region, Palm Beach County, Florida. The DEIS developed and evaluated ten wastewater management alternatives for the city of Boca Raton, Florida and the adjacent area of unincorporated Palm Beach County. A major concern of the EIS was the quality of the area's surface and groundwater resources and the impacts of the various wastewater management facilities on these resources.

EPA selected a modified No Federal Action alternative based on the projected impacts of growth and development in the area and the lack of demonstrated, existing water quality problems in the study area. This preferred alternative includes the following components:

1. Federal funding would be used in the expansion of the Glades Road facility to 17.5 mgd
2. No federal funding would be made available for the county portion of the planning area
4. Existing capacity would be used at the Sandalfoot Cove, American Homes, and Pheasant Walk plants until 1988-1990

5.(a) Sandalfoot Cove and American Homes plants could be expanded to 6.0 mgd each and Pheasant Walk to 0.7 mgd with either continued use of percolation ponds or discharge to the city's ocean outfall. Funding would be local.

(b) Pump all wastewater to the Glades Road plant for treatment and disposal. Funding would be local and an agreement would be required between the city and the county concerning implementation.

As part of the DEIS, EPA required a monitoring program to determine the impacts of the percolation ponds on the Biscayne Aquifer. A recommended Plan of Study for this monitoring program was published as an appendix to the DEIS. These recommendations have, by and large, been incorporated into this sampling program.

1.2 Study Plan

1.2.1 Study Background

The recommended Plan of Study (POS) in the DEIS included sampling in two development areas. The Pheasant Walk area is located north of Clint Moore Road and east of Military Trail. The Sandalfoot Cove area is southwest of the Pheasant Walk site, south of Boca Raton West Road (Hwy 808) and west of Florida's Turnpike (U.S. 1). The recommended sampling at both areas included analyses of wastewater treatment plant (WWTP) effluent, monitoring wells, ambient groundwater wells and drinking water wells.

1.2.1.1 Pheasant Walk System

The Pheasant Walk WWTP is a Palm Beach County facility. The WWTP has a current design capacity of 0.1 mgd with an expansion to 0.4 mgd within the next year. The plant is being operated as an activated sludge, extended aeration, secondary treatment facility. The physical layout of the plant consists of two separate treatment units with discrete inflows and outflows. No combination of flows is possible without physical modifications to the facility. The two units discharge to the easternmost two of the four available percolation ponds (Figure 1).

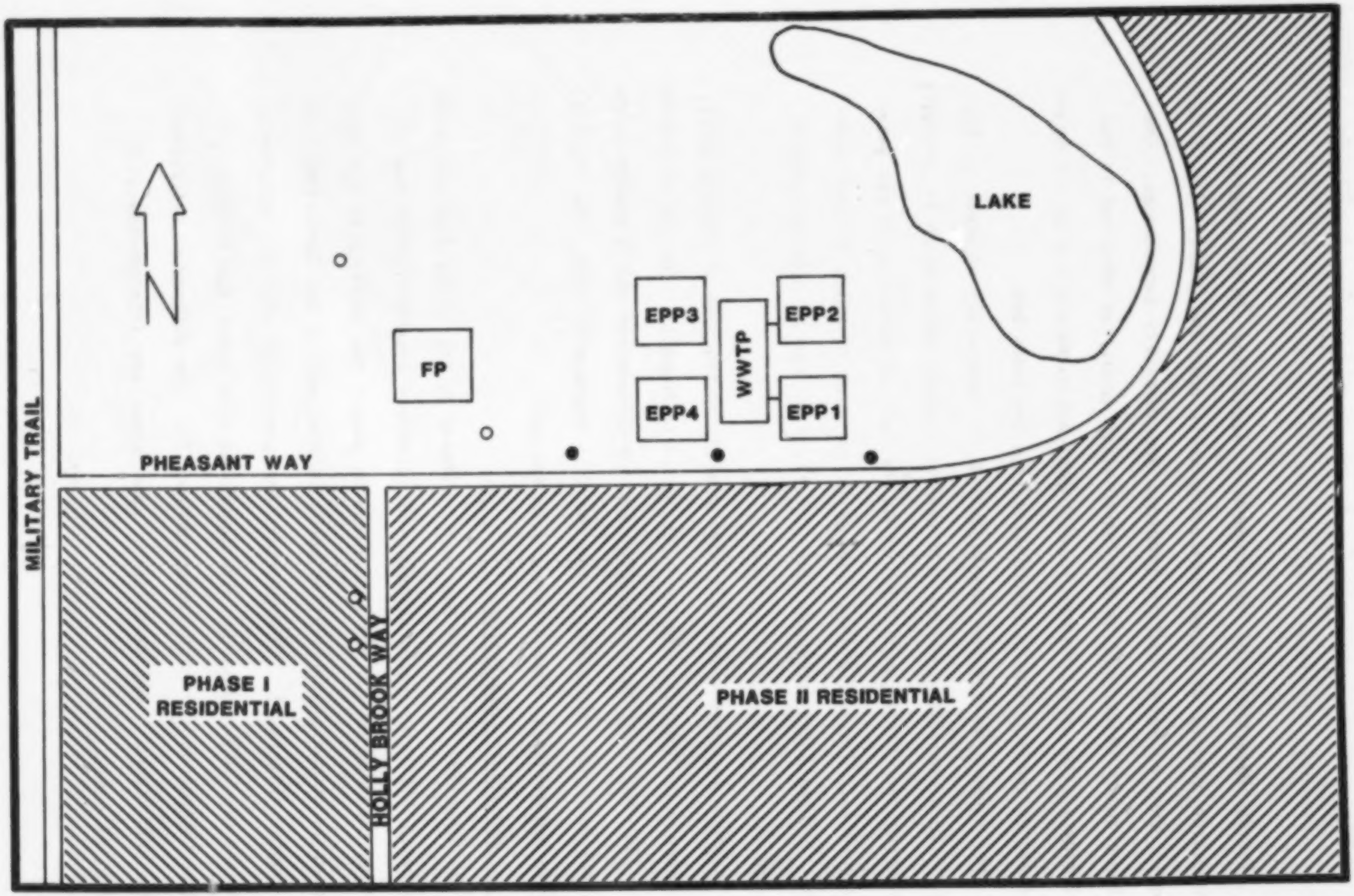

LAKE
EPP3
EPP2
WWTP
EPP4
EPP1
FP
N
MILITARY TRAIL
PHEASANT WAY
HOLLY BROOK WAY
PHASE I RESIDENTIAL
PHASE II RESIDENTIAL

FIGURE 1. PHEASANT WALK

FP - FILTRATION PLANT
EPP - EVAPORATION-PERCOLATION POND
WWTP - WASTEWATER TREATMENT PLANT

● MONITORING WELLS
○ DRINKING WATER WELLS

Florida Department of Environmental Regulation (FDER) monitors groundwater quality at three monitoring wells near the plant. The DEIS reports that no water quality problems are currently experienced. The effluent being discharged to the percolation ponds, as observed in the preliminary site visit, formed a small pool approximately 0.5 to 1.0 meters in diameter and was rapidly percolating into the sandy bed.

The Pheasant Walk Water Supply System is immediately adjacent to the WWTP. The water supply system is a reverse osmosis system which is currently exhibiting operational problems due to the lack of screening in the water supply wells. The system has four wells only one of which is used under normal circumstances although three of the four can be used at present (Figure 1).

Pheasant Walk has been built with phased construction of housing areas. The Phase I residential area was built prior to Phase II. The use of private wells (30'-40' deep) to supply water for non-consumptive use is common in the area but much more prevalent in the Phase II residential area. The Phase II area is hydraulically down gradient from the WWTP.

1.2.1.1 Sandalfoot Cove System

The Sandalfoot Cove WWTP has been purchased by the county from the South Palm Beach Utilities Corporation. The secondary treatment plant has an existing capacity of 2.0 mgd with plans to expand the facility to 3.5 mgd. Effluent is pumped to percolation ponds located east of the Sandalfoot Cove Golf Course (Figure 2). FDER monitors the groundwater near the percolation ponds and the WWTP effluent. The Sandalfoot Cove water supply wells are located throughout the golf course (Figure 2). The WWTP/Water Filtration Plant, golf course, and percolation pond areas are interspersed with residential areas.

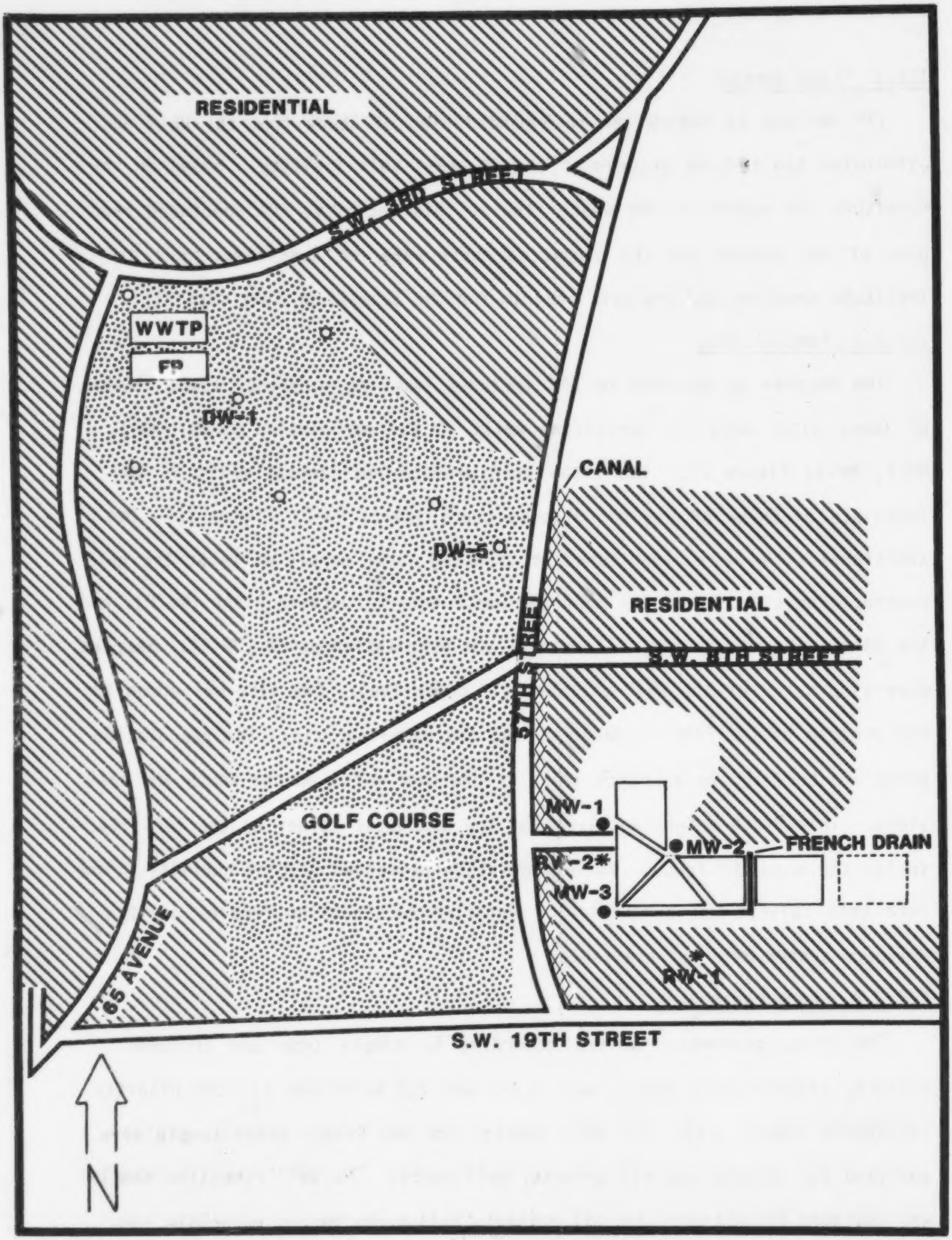

RESIDENTIAL
S.W. 3RD STREET
WWTP
FP
DW-1
CANAL
DW-5
RESIDENTIAL
S.W. 8TH STREET
57TH STREET
GOLF COURSE
MW-1
MW-2
FRENCH DRAIN
RW-2
MW-3
RW-1
65 AVENUE
S.W. 19TH STREET
N

FIGURE 2. SANDALFOOT COVE

* RESIDENTIAL WELLS ● MONITORING WELLS
○ DRINKING WATER WELLS

1.2.2 Study Design

EPA decided to modify the recommended Plan of Study from the DEIS and eliminated the testing program at the Pheasant Walk facility. Based on the magnitude and nature of the waste flow at this facility, EPA concluded that part of the program and the projected costs were not justified. EPA did institute sampling and analysis program for the Sandalfoot Cove facility.

1.2.2.1 Sample Sites

The program as designed by EPA included sampling at eight sites. Three of these sites were the monitoring wells at the percolation ponds (MW-1, MW-2, MW-3; Figure 2). Two sites were private residential wells in the immediate vicinity of the percolation ponds (RW-1, RW-2; Figure 2). Two additional sites were established at drinking water supply wells at the golf course. One site (DW-1) was near the Waste Water Treatment Plant (WWTP), and the other site was at the well nearest the percolation ponds (DW-5). Samples were also taken of the WWTP effluent (TP composite). One site was added to the program by the Field Manager during the sampling trip. The percolation ponds are bordered by a French drain or drainage ditch on the south and east sides. This ditch enters a culvert at the southwest corner of the facility, inside the security fence. While vegetation prevented gauging activity, flow into this culvert was substantial. Detailed construction reports on this drainage system were not available.

1.2.2.2 Study Parameters

The study parameters varied according to sample type and included nitrate, chlorophenoxy herbicides (2,4-D and 2,4,5-TP) and all EPA priority pollutants (Table 1.1). All well samples and the French drain sample were analyzed for nitrate and all priority pollutants. The WWTP composite sample was analyzed for nitrates and all priority pollutants except purgeable compounds. Eight discrete samples from the WWTP were analyzed for the purgeable (volatile) compounds. Herbicide analysis was only performed on MW-3, RW-2, FD-1 and TP-C.

Table 1.1. PBC Study Parameters and Analytical Methods.

Parameter	Storet Number	Method Number*
Nutrients		
Nitrate	00620	352
Chloropheroxy Herbicides		
2,4-D	2,4-D	8.40**
2,4,5-TP	2,4,5-TP	8.40**
Metals		
Asbestos	Asbst	239***
Beryllium	01010	210
Cadmium	01027	213
Chromium	01034	218
Copper	01042	220
Cyanide	00720	335
Lead	01051	239
Mercury	71900	245
Nickel	01067	249
Selenium	01147	270
Silver	01077	272
Thallium	01059	279
Zinc	01092	289
Purgeable Halocarbons		
Bromoform	32104	601
Bromodichloromethane	32101	601
Bromomethane	34413	601
Carbon tetrachloride	32102	601
Chlorodibromomethane	34306	601
Chloroethane	34311	601
2-Chloroethylvinyl ether	34576	601
Chloroform	32106	601
Chloromethane	34418	601
Dichlorodifluoromethane	32105	601
1,1-Dichloroethane	34496	601
1,2-Dichloroethane	34531	601
1,1-Dichloroethane	34501	601
1,2-(trans)-Dichloroethane	34541	601
1,2-Dichloropropane	34541	601
1,3-(trans)-Dichloropropane	34561	601
Fluorotrichloromethane	34475	601
Methylene chloride	34423	601
1,1,2,2-Tetrachloroethane	34475	601
Tetrachloroethene	34516	601
1,1,1-Trichloroethane	34506	601
1,1,2-Trichloroethane	34511	601
Trichloroethene	34506	601
Vinyl chloride	39175	601

Table 1.1. Continued

Purgeable Aromatics		
Benzene	34030	602
Chlorobenzene	34301	602
1,2-Dichlorobenzene	34536	602
1,3-Dichlorobenzene	34566	602
1,4-Dichlorobenzene	34571	602
Ethylbenzene	34371	602
Toluene	34010	602
Acrolein & Acrylonitrile		
Acrolein	34210	603
Acrylonitrile	32415	603
Phenols		
4-Chloro-3-methylphenol	34452	604
2-Chlorophenol	34586	604
2,4-Dichlorophenol	34601	604
2,4-Dimethylphenol	34606	604
4,6-Dinitro-2-methylphenol	34657	604
2,4-Dinitrophenol	34616	604
2-Nitrophenol	34591	604
4-Nitrophenol	34646	604
Pentachlorophenol	39094	604
Phenol	34694	604
2,4,6-Trichlorophenol	34621	604
Benzidines		
Benzidine	39120	605
3,3' Dichlorobenzidine	34631	605
Phthalates		
Bis(2-ethylhexyl)phthalate	39100	606
Butylbenzyl phthalate	34292	606
Di-n-butyl phthalate	34110	606
Di-n-octyl phthalate	34596	606
Diethyl phthalate	34336	606
Dimethyl phthalate	34341	606
1,2-Diphenylhydrazine	34346	606
Nitrosamines		
N-nitrosodi-n-propylamine	34428	607
N-nitrosodimethylamine	34438	607
N-nitrosodiphenylamine	34433	607
Organochlorine Pesticides		
Aldrin	39330	608
Chlordane	39350	608
4,4'-DDD	39310	608
4,4'-DDE	39320	608
4,4'-DDT	39300	608
Dieldrin	39380	608

Table 1.1. Continued

Nitroaromatics & Isophorone		
Isophorone	34408	609
Nitrobenzene	34447	609
2,4-Dinitrotoluene	34611	609
2,6-Dinitrotoluene	34626	609
Polynuclear Aromatic Hydrocarbons		
Acenaphthene	34205	610
Acenaphthylene	34200	610
Anthracene	34220	610
Benzo(a)anthracene	34526	610
Benzo(a)pyrene	34247	610
Benzo(b)fluoranthene	34230	610
Benzo(ghi)perylene	34521	610
Benzo(k)fluoranthene	34242	610
Chrysene	34320	610
Dibenzo(ah)anthracene	34556	610
Fluoranthene	34376	610
Fluorene	34381	610
Indeno(1,2,3-cd)pyrene	34403	610
Naphthalene	34696	610
Phenanthrene	34461	610
Pyrene	34469	610
Haloethers		
Bis(2-chloroethyl) ether	34273	611
Bis(2-chloroethoxy) methane	34278	611
Bis(2-chloroisopropyl) ether	34283	611
Bis(chloromethyl) ether	--	611
4-Bromophenyl phenyl ether	34636	611
4-Chlorophenyl phenyl ether	34641	611
Chlorinated Hydrocarbons		
Hexachlorocyclopentadiene	34386	612
Hexachlorobenzene	39700	612
Hexachlorobutadiene	34391	612
Hexachloroethane	34396	612
1,2,4-trichlorobenzene	34551	612
2-chloronaphthalene	34581	612
2,3,7,8-tetrachlorodibenzo-p-dioxin		
TCCD	34675	613

*EPA 1979a. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020.

or

EPA 1976b. Federal Register. December 3, 1979 - Vol. 44, No. 233 unless otherwise noted.

**EPA 1980. Test Methods for Evaluating Solid Waste. Physical/Chemical Methods. SW-846.

***USPHS/NIOSH. Membrane Filter Method for Evaluating Asbestos Fibers. P & CAM 239.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The Palm Beach County EIS Sampling Program is being conducted under an existing contract between the U. S. Environmental Protection Agency and Claude Terry & Associates, Inc. Dr. Claude E. Terry is the Project Director for all projects done under this contract. As Project Director, Dr. Terry has the overall responsibility for the series of studies, appoints the Project Manager, structures the study team, is responsible for resolving any potential personnel assignment conflicts and participates in the development of the Plan of Study.

The Project Manager for the PBC Sampling Program is Robert Hunter. Mr. Hunter has the responsibility for the direction of the study, preparation of task elements, budget monitoring, liaison with the EPA Regional Office, keeping the Project Officer informed of study progress, and satisfactory completion of the study. Mr. Hunter also supervised all field activity, including sampling.

The Quality Assurance Coordinator for the project is Carla Bahun. Ms. Bahun is responsible for the management of the quality assurance control program. In this capacity she is responsible for the review of the field and lab QA reports and the preparation of QA management reports.

Laboratory analyses were conducted under the supervision of Anita Patterson. Mrs. Patterson was responsible for the analysis of the samples and the maintenance and documentation of the quality assurance procedures.

Table 2.1 lists the key CTA personnel assigned to the PBC sampling programs. Resumes are included for these individuals (Appendix 7.2).

Table 2.1. CTA Personnel Available for the PBC Sampling Program.

Personnel	Job Classification
Claude Terry	Project Director
Robert Hunter	Project Manager
Anita Patterson	Laboratory Director
Greg Broune	Environmental Engineer/Hydrologist
Ruth Pappas	Chemist
Carla Bahun	Quality Assurance Coordinator

3.0 SAMPLE COLLECTION

Samples were collected in the study area on November 7 and 8, 1981 according to EPA procedures as outlined in the Plan of Study. Samples were collected at the Sandalfoot Cove Treatment Plant, percolation pond monitoring well, drinking water wells, residential wells and from the drainage system at the percolation ponds. Sampling activity is summarized in Table 3.1. Field data was noted for each sample and was recorded on standard forms (Appendix 7.3.1).

3.1 Wastewater Treatment Plant (TP)

Samples were collected of the Sandalfoot Cove TP effluent after the filtration and chlorine contact units. Grab samples were collected every three hours over a twenty-four hour period. All TP samples were collected with a solvent-rinsed glass bottle. Eight discrete grab samples of three bottles each were collected for volatile priority pollutant analyses. Volatile sample containers were solvent-rinsed, 40-ml glass bottles with teflon lined caps. In addition, separate grab samples were collected every three hours for a composite sample. Sample containers for these samples consisted of one-liter, acid-rinsed, solvent-rinsed glass bottles with teflon lined caps. These effluent samples were transported to Atlanta, Georgia, where they were flow proportionally composited. WWTP flow data is included in Appendix 7.3.2. All other sample containers were identical in composition and preparation.

3.2 Percolation Pond Monitoring Wells

Monitoring well samples (MW-1, MW-2, MW-3) were collected by bailing after well flushing. Each monitoring well was flushed for 10 minutes prior to sample collection. Flushing was accomplished by using a portable electric pump. Approximately 12 volumes of standing well water (volume of PVC pipe)

Table 3.1. Summary of Sampling Activity-Palm Beach County EIS.

Lab Number	Date	Time	Site Location
TP-1400	7 Nov 81	1400	Sandal Foot Cove Wastewater Treatment Plant
TP-1700	7 Nov 81	1706	Sandal Foot Cove Wastewater Treatment Plant
TP-2000	7 Nov 81	2001	Sandal Foot Cove Wastewater Treatment Plant
TP-2300	7 Nov 81	2303	Sandal Foot Cove Wastewater Treatment Plant
TP-0200	8 Nov 81	0200	Sandal Foot Cove Wastewater Treatment Plant
TP-0500	8 Nov 81	0500	Sandal Foot Cove Wastewater Treatment Plant
TP-0800	8 Nov 81	0800	Sandal Foot Cove Wastewater Treatment Plant
TP-1100	8 Nov 81	1100	Sandal Foot Cove Wastewater Treatment Plant
8298-1544 (RW-1)	7 Nov 81	1554	Residential well @ 8298 SW 16th - South of percolation ponds
22905-1637 (RW-2)	7 Nov 81	1652	Residential well @ 22905 SW 56th Ave. - West of percolation ponds
DW-5-0820	8 Nov 81	0820	Drinking water well #5 - well closest to percolation ponds
DW-1-0845	8 Nov 81	0845	Drinking water well #1 - well closest to WWTP
MW-1-0921	8 Nov 81	0921	Monitoring well northwest of percolation ponds
MW-2-0958	8 Nov 81	0958	Monitoring well east of polishing pond
MW-3-1020	8 Nov 81	1020	Monitoring well southwest of percolation ponds
FD-1-1225	8 Nov 81	1245	French drain at culvert southwest of percolation ponds

were pumped from each well prior to sample collection (Table 3.2). Details of the 2-inch PVC well construction are included in the field data sheets (Appendix 7.3.1). All bailers (PVC) were solvent rinsed and then double rinsed with well water prior to sample collection.

3.3 Water Supply Wells

The water supply or drinking water wells (DW-1, DW-5) are high volume deep wells (Appendix 7.3.3). These 10"-12" wells are 100'-160' deep and provide raw water to the Sandalfoot Cove Filtration Plant adjacent to the WWTP. Both DW-1 and DW-5 were in operation prior to and during sample collection. Samples were collected from the in-place pump systems after flushing the sampling spigot for five minutes.

3.4 Residential Wells

Water samples were collected from two private residential wells (RW-1, RW-2) near the percolation ponds. As for the water supply wells, the residential well samples were taken directly from the in-place pump system. Wells were pumped for approximately five minutes prior to sample collection. Construction information presented in the field data sheets is based on interviews with the owners and was not verified with construction companies. Information on RW-1 is probably accurate since the owner specified the depth of the well to avoid odor problems.

3.5 Percolation Pond Area Drainage System

The presence of the French drain along the east and south periphery of the percolation pond site was not considered in the initial study design. Samples were collected (FD-1) at the option of the Field Director. Flow was not measured due to the heavy vegetation. No detailed engineering information was available on the construction of the drainage system, but it is possible that the ditch is below the bottom level of the percolation ponds.

Table 3.2. Well Operation and Flushing Data.

Well	Daily Operation	Flushing Period (min.)	Flushing Rate (gal./min.)	Well Volume (gal.)	Volumes Flushed
MW-1	None	10	2.44	1.98	12.3
MW-2	None	10	2.51	2.16	11.6
MW-3	None	10	2.42	1.87	12.9
DW-1	Scheduled	5	--	415.6	--
DW-5	Scheduled	5	--	415.2	--
RW-1	Intermittent	5	--	13.2	--
RW-2	Intermittent	7	--	6.43	--

The drainage flow is believed to run to the canal via a culvert, although no outfall is visible.

Flow in the ditch was substantial and could be from either the percolation ponds or rainfall. Local precipitation data for the period is included in Appendix 7.3.4.

3.6 Sample Custody, Preservation, and Holding Times

Samples were in the possession of the Field Director from the time of collection until shipping via air to Atlanta, Georgia. Samples were retrieved upon arrival at the airport by the Field Director and transported to the CTA laboratory. All samples were maintained in a secured, refrigerated area and signed over to the Laboratory Director the morning of November 9, 1981. The Laboratory Director maintained custody of the samples until analysis.

Sample preservation was conducted in the field. Cyanide samples were tested for oxidizing agents and preserved with NaOH to a pH of greater than 12.0. Metal samples were preserved with HNO_3 to a pH of less than 2.0. All other samples were preserved by cooling to 4 °C during transit and in the lab.

Sample holding times were in accordance with EPA recommendations (Federal Register, 3 Dec. 79, Vol. 44, No. 233). Sampling was scheduled over the weekend to facilitate the timely analysis of samples.

4.0 ANALYTICAL PROCEDURES

Water samples were analyzed for nitrates, chlorophenoxy herbicides and EPA priority pollutants according to EPA approved techniques (Federal Register, 3 Dec. 79, Vol. 44, No. 233). Most organic analyses were performed according to EPA methods on a Perkin-Elmer Sigma III B gas chromatograph, and metals were analyzed on a Perkin-Elmer Atomic Absorption Spectrophotometer. Detailed procedures were included in the Quality Assurance Project Plan submitted to EPA and approved prior to the initiation of sampling activity. EPA approved technique reference numbers are included in Table 1.1. However, EPA currently lacks an approved procedure for asbestos. Following consultation with EPA, CTA selected a procedure approved by the U.S. Public Health Service and the National Institute of Occupational Safety and Health (USPHS/NIOSH).

The levels of concern for the priority pollutants are often exceedingly low. Therefore, the minimum detection limits for the analytical methodologies must also be quite low. Information concerning detection limits, toxicity data, levels of human health concern, and criteria levels are summarized in Table 4.1. The reported levels for detection limits are conservative. The use of multi-parameter standards was used in the analysis and these matrices produce detection limits of larger concentrations. Detection limits were defined at a response of 10 percent of the full scale peak as opposed to 2 percent as is often done. If peaks were noted below confidence levels then testing was repeated with single parameter standards to lower the detection limits below those in Table 4.1.

Table 4.1. Detection Limits, Toxicity Data, and Human Health Criteria for Parameters of Analysis for the PBC Sampling Program (ug/l).

Parameter	Detection Limit	TOXICITY DATA				HUMAN HEALTH			Criteria
		FRESHWATER		MARINE		INCR CANCER RISK			
		Acute	Chronic	Acute	Chronic	10-5	10-6	10-7	
Nutrients									
Nitrate	0.1*	--	--	--	--	--	--	--	10*
Chlorophenoxy Herbicides									
2,4-D	20	--	--	--	--	--	--	--	100
2,4,5-TP	20	--	--	--	--	--	--	--	10
Metals									
Asbestos		N/A	N/A	N/A	N/A	*** 300,000	*** 30,000	*** 3,000	--
Beryllium	100	130	5.3	N/A	N/A	37 ug/l	3.7	0.37	--
Cadmium	100	((1))	((1))	4.5	59	--	--	--	10
Chromium Hexa (VI)	100	Max 21	Avg 0.29	Max 1,260	Avg 18	--	--	--	50
Copper	100	Max 5.6	Avg (2)	Max 23	Avg 4.0	--	--	--	(1.0*)
Cyanide	20	Max 52	Avg 3.5	30	2.0	--	--		200
Lead	100	((3))	((3))	668	25	--	--	--	50
Mercury	1	Max 0.0017	Avg 0.00057	Max 3.7	Avg 0.025	--	--	--	144**
Nickel	100	((4))	((4))	Max 140	Avg 7.1	--	--	--	13.4
Selenium	2	Max 260	Avg 35	Max 410	Avg 54	--	--	--	10
Silver	100	((5))	8.12	Max 2.3	N/A	--	--	--	50
Thallium	100	1400	40	2.130	N/A	--	--	--	13
Zinc	100	((6))	Avg 47	Max 170	Avg 58	--	--	--	(5*)
Purgeable Halocarbons									
Bromoform	0.4	11,000	N/A	12,000	6,400	1.9	0.19	0.019	--
Bromodichloromethane	0.4	11,000	N/A	12,000	6,400	1.9	0.19	0.019	--
Bromomethane	0.4	11,000	N/A	12,000	6,400	1.9	0.19	0.019	--
Carbon tetrachloride	0.4	35,200	N/A	50,000	N/A	4.0	0.4	0.04	--
Chlorodibromomethane	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloroethane	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Chloroethylvinyl ether	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloroform	0.4	28,900	1,240	N/A	N/A	1.9	0.19	0.019	--
Chloromethane	0.4	11,000	N/A	12,000	6,400	1.9	0.19	0.019	--
Dichlorodifluoromethane	0.4	11,000	N/A	12,000	6,400	1.9	0.19	0.019	--
1,1-Dichloroethane	0.4	11,000	N/A	12,000	6,400	1.9	0.19	0.019	--
1,2-Dichloroethane	0.4	118,000	20,000	113,000	--	9.4	0.94	0.094	--
1,1-Dichloroethene	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2-(trans)-Dichloroethane	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichloropropane	0.4	23,000	5,700	10,300	3,040	N/A	N/A	N/A	N/A
1,3-(trans)-Dichloropropane	0.4	23,000	5,700	10,300	3,040	N/A	N/A	N/A	N/A
Fluorotrichloromethane	0.4	11,000	N/A	12,000	6,400	1.9	0.19	0.019	--
Methylene chloride	0.4	11,000	N/A	12,000	6,400	1.9	0.19	0.019	--
1,1,2,2-Tetrachloroethane	0.4	9,320	2,400	9,020	N/A	1.7	0.17	0.017	--
Tetrachloroethane	0.4	9,320	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,1,1-Trichloroethane	0.4	18,000	N/A	31,200	N/A	--	--	--	18.4*
1,1,2-Trichloroethane	0.4	18,000	9,400	N/A	N/A	6.0	0.6	0.06	--
Trichloroethane	0.4	18,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 4.1. Continued

Parameter	Detection Limit	TOXICITY DATA				HUMAN HEALTH			
		FRESHWATER		MARINE		INCR	CANCER	RISK	
		Acute	Chronic	Acute	Chronic	10-5	10-6	10-7	Criteria
Vinyl chloride	0.4	N/A	N/A	N/A	N/A	2.0	2.0	0.2	--
Purgeable Aromatics									
Benzene	20	5,300	N/A	5,100	N/A	6.6	0.66	0.66	--
Chlorobenzene	20	250	N/A	160	129	--	--	--	488 (20)
1,2-Dichlorobenzene	6	1,120	763	1,970	N/A	--	--	--	400
1,3-Dichlorobenzene	6	1,120	763	1,970	N/A	--	--	--	400
1,4-Dichlorobenzene	6	1,120	763	1,970	N/A	--	--	--	400
Ethylbenzene	20	32,000	N/A	430	N/A	--	--	--	1.4
Toluene	20	17,500	N/A	6,300	5,000	--	--	--	14.3
Acrolein & Acrylonitrile									
Acrolein	20	68	21	55	N/A	--	--	--	320
Acrylonitrile	20	7,550	N/A	N/A	N/A	0.58	0.058	0.006	--
Phenols									
4-Chloro-3-methylphenol	15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Chlorophenol	5	4,380	N/A	N/A	N/A	--	--	--	(0.1)
2,4-Dichlorophenol	5	2,020	365	N/A	N/A	--	--	--	3.09 (0.3)
2,4-Dimethylphenol	5	2,120	N/A	N/A	N/A	--	--	--	(400)
4,6-Dinitro-2-methylphenol	20	230	N/A	4,850	N/A	N/A	N/A	N/A	70
2,4-Dinitrophenol	15	230	N/A	4,850	N/A	N/A	N/A	N/A	70
2-Nitrophenol	5	230	N/A	4,850	N/A	N/A	N/A	N/A	N/A
4-Nitrophenol	20	230	N/A	4,850	N/A	N/A	N/A	N/A	N/A
Pentachlorophenol	20	55	3.2	53	34	--	--	--	0.1* (30)
Phenol	5	10,200	2,560	5,800	N/A	--	--	--	3.5 (0.3*)
2,4,6-Trichlorophenol	10	N/A	970	N/A	N/A	12	1.2	0.12	--
Benzidines									
Benzidine	0.5	2,500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3,3-Dichlorobenzidine	0.5	N/A	N/A	N/A	N/A	103**	10.3**	1.03**	--
Phthalates									
Bis(2-ethylhexyl)phthalate	5	940	3	2,944	N/A	--	--	--	15*
Butylbenzyl phthalate	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Di-n-butyl phthalate	5	940	3	2,944	N/A	--	--	--	34*
Di-n-octyl phthalate	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Diethyl phthalate	10	940	3	2,944	N/A	--	--	--	350*
Dimethyl phthalate	10	940	3	2,944	N/A	--	--	--	313*
1,2-Diphenylhydrazine	20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nitrosamines									
N-nitrosodi-n-propylamine	2	5,850	N/A	3.3×10^6	N/A	8.0	0.8	0.008	--
N-nitrosodimethylamine	2	5,850	N/A	3.3×10^6	N/A	14**	1.4**	0.14**	--
N-nitrosodiphenylamine	2	5,850	N/A	3.3×10^6	N/A	49	4.9	0.49	--

Table 4.1. Continued

Parameter	Detection Limit	TOXICITY DATA				HUMAN HEALTH			
		FRESHWATER		MARINE		INCR	CANCER	RISK	
		Acute	Chronic	Acute	Chronic	10-5	10-6	10-7	Criteria
Organochlorine Pesticides									
Aldrin	0.02	3.0	N/A	1.3	N/A	0.74**	0.074**	0.0074**	--
Chlordane	0.04	Cr 2.4	Cr 0.0043	Cr 0.09	0.0040	4.6**	0.46**	0.046**	N/A
4,4-DDD	0.06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4,4-DDE	0.04	1,050	N/A	14	N/A	N/A	N/A	N/A	N/A
4,4-DDT	0.06	Max 1.1	Avg 0.0010	Max 0.13	Avg 0.0010	0.24**	0.024**	0.0024**	--
Dieldrin	0.04	Cr 2.5	Cr 0.0019	Cr 0.71	0.0019	0.71**	0.071**	0.0071**	--
Nitroaromatics & Isophorone									
Isophorone	10	117,000	N/A	12,900	N/A	--	--	--	5.2*
Nitrobenzene	10								
2,4-Dinitrotoluene	1	330	230	590	N/A	1.1	0.11	0.011	--
2,6-Dinitrotoluene	0.2	330	230	590	N/A	1.1	0.11	0.011	--
Polynuclear Aromatic Hydrocarbon									
Acenaphthene	10	17,000	N/A	970	710	--	--	--	(0.02*)
Acenaphthylene	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Anthracene	1	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Benzo(a)anthracene	1	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Benzo(a)pyrene	1	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Benzo(b)fluoranthene	2	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Benzo(ghi)perylene	2	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Benzo(k)fluoranthene	1	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Chrysene	1	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Dibenzo(ah)anthracene	2	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Fluoranthene	2	3,980	N/A	40	16	--	--	--	42
Flourene	2	N/A	N/A	300	N/A	28**	2.8**	0.28	--
Indeno(1,2,3-cd)pyrene	1	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Naphthalene	10	2,300	620	2,350	N/A	N/A	N/A	N/A	N/A
Phenanthrene	1	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Pyrene	1	N/A	N/A	300	N/A	28**	2.8**	0.28**	--
Haloethers									
Bis(2-chloroethyl) ether	2	238,000	N/A	N/A	N/A	0.3	0.03	0.003	--
Bis(2-chloroethoxy) methane	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	--
Bis(2-chloroisopropyl) ether	2	N/A	N/A	N/A	N/A	--	--	--	34.7
Bis(chloromethyl) ether	2	N/A	N/A	N/A	N/A	37.6x10^6	3.76x6^6	0.376x10^6	
4-Bromophenyl phenyl ether	5	360	120	N/A	N/A	N/A	N/A	N/A	N/A
4-Chlorophenyl phenyl ether	5	360	120	N/A	N/A	N/A	N/A	N/A	N/A
Chlorinated Hydrocarbons									
Hexachlorocyclopentadiene	0.2	7.0	5.2	7.0	N/A	--	--	--	206 (1)
Hexachlorobenzene	0.04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 4.1. Continued

Parameter	Detection Limit	TOXICITY DATA				HUMAN HEALTH			Criteria
		FRESHWATER		MARINE		INCR	CANCER	RISK	
		Acute	Chronic	Acute	Chronic	10-5	10-6	10-7	
Hexachlorobutadiene	2	90	9.3	32	N/A	4.47	0.45	0.045	--
Hexachloroethane	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trichlorobenzene	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-Chloronaphthalene	0.2	1,600	N/A	7.5	N/A	N/A	N/A	N/A	N/A
2,3,7,8-Tetrachlorodibenzo-p-dioxin TCCD	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*mg/l
**ng/l
***# of fibers/l
(organoleptic data)
((#)) = see attached formula table
N/A = Not Available

((1)) Total Recoverable Cadium - Freshwater
24 hr avg = $e^{(1.05\ (\ln\ (hardness)) - 8.53}$
Max = e (1.05 (ln (hardness)) - 3.73
Hardness as $CaCO_3$: (ug/l) 50 - 100 - 200
24 hr avg (ug/l): 0.012 - 0.025 - 0.051
Max (ug/l): 1.5 - 3.0 - 6.3

((2)) Total Recoverable Copper - Freshwater
Max = $e^{(0.94\ (\ln\ (hardness)) - 1.23}$
Hardness as $CaCO_3$ (ug/l): 50 - 100 - 200
Max (ug/l): 12 - 22 - 43

((3)) Total Recoverable Lead - Freshwater
24 hr avg = $e^{(2.35\ (\ln\ (hardness)) - 9.48}$
Max = $e^{(1.22\ (\ln\ (hardness)) - 0.47}$
Hardness as $CaCO_3$ (ug/l): 50 - 100 - 200
24 hr avg (ug/l): 0.75 - 3.8 - 20
Max (ug/l): 74 - 170 - 400

((4)) Total Recoverable Nickel - Freshwater
24 hr avg = $e^{(0.76\ (\ln\ (hardness)) + 1.06}$
Max = e (0.76 (ln (hardness)) + 4.02
Hardness as $CaCO_3$ (ug/l): 50 - 100 - 200
24 hr avg (ug/l): 56 - 96 - 160
Max (ug/l): 1,100 - 1,800 - 3,100

((5)) Total Recoverable Silver - Freshwater
Max = $e^{(1.72\ (\ln\ (hardness)) - 6.52}$
Hardness as $CaCO_3$ (ug/l): 50 - 100 - 200
Max (ugl): 1.2 - 4.1 - 13

((6)) Total Recoverable Zinc - Freshwater
Max = $e^{(0.83\ (\ln\ (hardness)) + 1.95}$
Hardness as $CaCO_3$ (ug/l): 50 - 100 - 200
Max (ug/l): 180 - 320 - 570

5.0 ANALYTICAL RESULTS

The results of the sample analyses are summarized in the following tables. Pollutant levels are generally very low and often below the analytical detection limits.

Table 5.1. Analytical Results - PBC - EIS.

Parameter	Detection Limit ug/l	TP Composite	RW-1	RW-2	DW-5	DW-1	MW-1	MW-2	MW-3	FD-1
Antimony	5.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Arsenic	1.0	BDL	BDL	2.0	BDL	BDL	1.6	10	1.5	1.9
Asbestos		ND	ND	ND	ND	ND	ND	ND	ND	ND
Berylluim	100	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Cadmium	100	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chromium	100	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Copper	100	100	100	100	100	100	100	100	100	100
Cyanide	20	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead	100	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury	1.0	1.7	32	12	BDL	BDL	BDL	4.3	BDL	BDL
Nickel	100	100	100	100	100	100	100	100	100	100
Selenium	2.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Silver	100	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Thallium	100	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Zinc	100	100	200	100	100	100	100	100	100	100

Parameters	Detection Limit ug/l	TP1400	TP1700	TP2000	TP2300	TP0200	TP0500	TP0800	TP1100	RW1	RW2	DW5	DW1	MW1	MW2	MW3	FD1
Purgeable Halocarbons																	
Bromoform	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloromethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bropmomethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Carbon tetrachloride	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Chloroethylvinyl ether	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloromethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dichlorodifluoromethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloroethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethene	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-(trans)-Dichloroethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloropropane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,3-(trans)-Dichloropropane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Fluorotrichloromenthane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene chloride	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethane	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Vinyl chloride	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Table 5.1. Continued

Parameters	Detection Limit ug/l	TP1400	TP1700	TP2000	TP2300	TP0200	TP0500	TP0800	TP1100	RW1	RW2	DW5	DW1	MW1	MW2	MW3	FD1
Purgeable Aromatics																	
Benzene	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Ethylbenzene	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Toluene	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Acrolein Acrylonitrile																	
Acrolein	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Acrylonitrile	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Parameters	Detection Limit ug/l	TP Composite	RW-1	RW-2	DW-5	DW-1	MW-1	MW-2	MW-3	FD-1
Phenols										
4-Chloro-3-methylphenol	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Chlorophenol	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4-Dichlorophenol	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4-Dimethylphenol	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4,6-Dinitro-2-methylphenol	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4-Dinitrophenol	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Nitrophenol	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4-Nitrophenol	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Pentachlorophenol	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Phenol	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4,6-Trichlorophenol	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzidines										
Benzidine	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
3,3-Dichlorobenzidine	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Phthalates										
Bis(2-ethylhexyl)phthalate	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Butylbenzyl phthalate	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Di-n-butyl phthalate	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Di-n-octyl phthalate	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Diethyl phthalate	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dimethyl phthalate	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Diphenylhydrazine	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Nitrosamines										
N-nitrosodi-n-propylamine	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
N-nitrosodimethylamine	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
N-nitrosodiphenylamine	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Table 5.1. Continued

Parameter	Detection Limit ug/l	TP Composite	RW-1	RW-2	DW-5	DW-1	MW-1	MW-2	MW-3	FD-1
Organochlorine Pesticides										
Aldrin	0.02	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlordane	0.04	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4,4-DDD	0.06	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4,4-DDE	0.04	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4,4-DDT	0.06	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dieldrin	0.04	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Nitroaromatics & Isophorone										
Isophorone	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Nitrobenzene	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4-Dinitrotoluene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,6-Dinitrotoluene	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons										
Acenaphthene	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Acenaphthylene	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Anthracene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzo(a)anthracene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzo(a)pyrene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzo(b)fluoranthene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzo(ghi)perylene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzo(k)fluoranthene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chrysene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dibenzo(ah)anthracene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Fluoranthene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Fluorene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Indeno(1,2,3-cd)pyrene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Naphthalene	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Phenanthrene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Pyrene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Haloethers										
Bis(2-chloroethyl) ether	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bis(2-chloroethoxy) methane	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bis(2-chloroisopropyl) ether	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bis(chloromethyl) ether	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4-Bromophenyl phenyl ether	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4-Chlorophenyl phenyl ether	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlorinated Hydrocarbons										
Hexachlorocyclopentadiene	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Hexachlorobenzene	0.04	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Hexachlorobutadiene	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Hexachloroethane	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2,4-Trichlorobenzene	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Chloronaphthalene	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

able 5.1. Continued

Parameter	Detection Limit ug/l	TP Composite	RW-1	RW-2	DW-5	DW-1	MW-1	MW-2	MW-3	FD-1
2,3,7,8-Tetrachlorodibenzo-p-dioxin										
TCCD	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Nutrients										
Nitrate	0.1 mg/l	2.06 mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloropheroxy Herbicides										
2,4-D	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4,5-TP	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

6.0 QUALITY ASSURANCE DATA

Laboratory quality assurance methods followed EPA guidelines. At least one method blank was run with each analysis. The method blank was carried through the entire procedure with the samples. A minimum of three standards for each organic parameter were analyzed at the beginning of each analysis. One standard was analyzed at the end of each analysis. Standards were also run when the instrument operating conditions were changed in any way. A minimum of one duplicate and one spike were analyzed for every ten samples except for the purgeable organics. Because the integrity of these samples is compromised when the container is opened, no spikes were analyzed. EPA check samples were analyzed with the metal samples in addition to the standards, spikes, and blanks.

Table 6.1. Quality Assurance Data.

	Samples	Duplicates	Spikes	Standards	Blanks
Purgeable Halocarbons	16	2	-	5	1
Purgeable Aromatics	16	2	-	5	1
Acrolein & Acrylonitrile	16	2	-	5	1
Phenols	9	1	1	3	1
Benzidines	9	1	1	4	1
Phthalates	9	1	1	3	1
Nitrosamines	9	1	1	3	1
Organochlorine Pesticides	9	1	1	6	1
Nitroaromatics & Isophorone	9	1	1	3	1
Polynuclear Aromatic Hydrocarbons	9	1	1	3	1
Haloethers	9	1	1	3	1
Chlorinated Hydrocarbons	9	1	1	3	1
Nutrients	9	1	1	3	1
Chlorophenoxy Herbicides	9	1	1	3	1
Antimony	9	1	1	4	1
Arsenic	9	1	1	6	1
Asbestos	9	1	1	0	1
Beryllium	9	1	1	2	1
Cadmium	9	2	2	3	1
Chromium	9	2	2	3	1
Copper	9	2	2	3	1
Cyanide	9	1	1	5	1
Lead	9	2	2	3	1
Mercury	9	1	1	13	4
Nickel	9	1	1	3	1
Selenium	9	1	1	7	1
Silver	9	1	1	2	1
Thallium	9	1	1	3	1
Zinc	9	2	2	3	1

CTA FIELD DATA SHEET

PROJECT PBC - EIS
INVESTIGATOR R. Hunter

Well ☐
Point Source ☒

Samples to: (#)

Bact	Biol	Chem	Other
		1 + 3	

Starting Date

Day	Month	Year
7	Nov.	81

Sample Temp. (°C) ☐☐☐☐

Station No. SC-WWTP

Starting Time (24)

1	4	0	0

DO (mg/1) ☐☐☐☐

Sample Depth (m) Surface

Ending Date

Day	Month	Year
7	Nov	81

Cond. (uMHOS/CM) ☐☐☐☐

Lab Number TP-1400-A,B,C,D

Ending Time (24)

1	4	0	9

Turbidity (NTU) ☐☐☐☐

Type of Sample

Grab	Composite	Other
X		

pH ☐☐☐☐

Other ☐☐☐☐

SAMPLE SITE DESCRIPTION (Map on Reverse): Samples taken from tank after filtration and chlorine contact chamber. Sample site includes total flow from both treatment units.

SAMPLING ACTIVITY DESCRIPTION: Samples consists of one one-liter bottle for composite sample (A) and three 40-ml bottles for volatile analysis (B,C,D).

CTA FIELD DATA SHEET

PROJECT PBC - EIS
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Samples to: (#)

Bact	Biol	Chem	Other
		2 + 6	

Starting Date

Day	Month	Year
7	Nov.	81

Sample Temp. (°C) ☐☐☐☐

Station No. SC-WWTP

Starting Time (24) 2 0 0 1

DO (mg/1) ☐☐☐☐

Sample Depth (m) Surface

Ending Date

Day	Month	Year
7	Nov	81

Cond. (uMHOS/CM) ☐☐☐☐

Lab Number TP-2000-(A-H)

Ending Time (24) 2 0 1 1

Turbidity (NTU) ☐☐☐☐

Type of Sample

Grab	Composite	Other
X		

pH ☐☐☐☐

Other ☐☐☐☐

SAMPLE SITE DESCRIPTION (Map on Reverse): Same as (TP-1400) - increased flow and foam.

SAMPLING ACTIVITY DESCRIPTION: Two sets of samples taken: (A) & (B) are one-liter glass bottles for the composite; (B,C,D) and (F,G,H) are 40-ml glass bottles for volatiles analysis

CTA FIELD DATA SHEET

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Samples to: (#)

Bact	Biol	Chem	Other
		1 + 3	

Starting Date

Day	Month	Year
7	Nov	81

Sample Temp. (°C)

Station No. SC-WWTP

Starting Time (24)

1	7	0	6

DO (mg/1)

Sample Depth (m) Surface

Ending Date

Day	Month	Year
7	Nov	81

Cond. (uMHOS/CM)

Lab Number TP-1700-A,B,C,D

Ending Time (24)

1	7	1	4

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): Same as (TP-1400) except an increase in flow and a good deal of foaming in tank.

SAMPLING ACTIVITY DESCRIPTION: Samples consist of one one-liter bottle for composite sample (A) and three 40-ml bottles for volatile analysis (B,C,D).

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Samples to: (#)

Bact	Biol	Chem	Other
		2 + 3	

Starting Date

Day	Month	Year
7	Nov	81

Sample Temp. (°C)

Station No.

SC-WWTP

Starting Time (24)

2	3	0	3

DO (mg/l)

Sample Depth (m)

Surface

Ending Date

Day	Month	Year
7	Nov	81

Cond. (uMHOS/CM)

Lab Number

TP-2300 (A-E)

Ending Time (24)

2	3	0	8

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): Same as (TP-1400) - flow discontinuous - no flow at 2300 hours - flow from 2303 to 2307.

SAMPLING ACTIVITY DESCRIPTION: Two sets of samples taken: (A) & (E) are one-liter glass bottles for the composite; (B), (C), & (D) are 40-ml glass bottles for volatiles analysis. Sample taken directly from flow, not tank.

CTA FIELD DATA SHEET

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Samples to: (#)

Bact	Biol	Chem	Other
		1 - 3	

Starting Date

Day	Month	Year
8	Nov	81

Sample Temp. (^oC)

Station No.

SC-WWTP

Starting Time (24)

0	2	0	0

DO (mg/1)

Sample Depth (m)

Surface

Ending Date

Day	Month	Year
8	Nov	81

Cond. (uMHOS/CM)

Lab Number

TP-0200 (A-D)

Ending Time (24)

0	2	0	5

Turbidity (NTU)

Type of Sample

Grab	Composite	Other:
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): Same as (TP-1400). Flow continuous over ten-minute period.

SAMPLING ACTIVITY DESCRIPTION: One set of samples taken: (A) is a one-liter glass bottle for the composite; (B), (C), & (D) are 40-ml glass bottles for volatiles analysis.

CTA FIELD DATA SHEET

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Samples to: (#)

Bact	Biol	Chem	Other
		1 + 3	

Starting Date

Day	Month	Year
8	Nov	81

Sample Temp. (°C)

Station No.

SC-WWTP

Starting Time (24)

0	5	0	0

DO (mg/1)

Sample Depth (m)

Surface

Ending Date

Day	Month	Year
8	Nov.	81

Cond. (uMHOS/CM)

Lab Number

TP-0500 (A-D)

Ending Time (24)

0	5	0	8

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): Same as (TP-1400). Flow continuous - similar to (TP-0200).

SAMPLING ACTIVITY DESCRIPTION: One set of samples taken: (A) is a one-liter glass bottle for the composite; (B),(C), & (D) are 40-ml glass bottles for the volatiles analysis.

CTA FIELD DATA SHEET

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Samples to: (#)

Bact	Biol	Chem	Other
		2 + 3	

Starting Date

Day	Month	Year
8	Nov	81

Sample Temp. (°C)

Station No.

SC-WWTP

Starting Time (24)

0	8	0	0

DO (mg/l)

Sample Depth (m)

Surface

Ending Date

Day	Month	Year
8	Nov	81

Cond. (uMHOS/CM)

Lab Number

TP-0800

Ending Time (24)

0	8	0	4

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): Same as (TP-1400); flow increasing since (TP-0400).

SAMPLING ACTIVITY DESCRIPTION: Two sets of samples taken: (A) & (E) are one-liter glass bottles for the composite; (B),(C),&(D) are 40-ml glass bottles for the volatiles analysis.

CTA FIELD DATA SHEET

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Samples to: (#)

Bact	Biol	Chem	Other
		2 + 3	

Starting Date

Day	Month	Year
8	Nov.	81

Sample Temp. (^{o}C)

Station No. SC-WWTP

Starting Time (24) 1 1 0 0

DO (mg/1)

Sample Depth (m) Surface

Ending Date

Day	Month	Year
8	Nov	81

Cond. (uMHOS/CM)

Lab Number TP-1100

Ending Time (24) 1 1 0 7

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): Same as (TP-1400). Flow appears to be at highest point during the 24-hour sampling.

SAMPLING ACTIVITY DESCRIPTION: Two sets of samples taken: (A) & (E) are one-liter glass bottles for the composite; (B),(C),&(D) are 40-ml glass bottles for the volatiles analysis.

CTA FIELD DATA SHEET

PROJECT PBC - EIS Well ☒
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Samples to: (#)

Bact	Biol	Chem	Other
		7	

Starting Date

Day	Month	Year
8	Nov	81

Sample Temp. (°C)

Station No.: SCMW - 1

Starting Time (24)

0	9	2	1

DO (mg/1)

Sample Depth (m): 13 feet

Ending Date

Day	Month	Year
8	Nov	81

Cond. (uMHOS/CM)

Lab Number: MW-1-0921

Ending Time (24)

0	9	4	5

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): 25.2 feet deep—total
6.1 feet water depth
13 feet of hose in well for pumping

SAMPLING ACTIVITY DESCRIPTION: Pumping started at 0931; continued pumping to 0941 before sampling. A & B = one-gallon glass; C = one-liter glass; D = one-liter PP; E,F,G = 40-ml glass; pumping rate = one gallon per 24.5 seconds & 24.6 seconds. No sulfur smell.

CTA FIELD DATA SHEET

PROJECT PBC - EIS Well ☒
INVESTIGATOR R. Hunter Point Source ☐

Samples to: (#)

Bact	Biol	Chem	Other
		7	

Starting Date

Day	Month	Year
8	Nov	81

Sample Temp. (°C)

Station No.: SCMW-2

Starting Time (24)

0	9	5	8

DO (mg/1)

Sample Depth (m): 17.0 feet

Ending Date

Day	Month	Year
8	Nov.	81

Cond. (uMHOS/CM)

Lab Number: MW-2-0958

Ending Time (24)

1	0	1	3

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): 24.0 feet to bottom of well
3.2-feet to water
17.0 feet of hose in for pumping

SAMPLING ACTIVITY DESCRIPTION: Pumping started at 0958. Continued pumping to 1008 before sampling. A & B = one-gallon glass; C = one-liter glass; D = one-liter PP; E,F,G = 40-ml glass
Pumping rate: one gallon per: 24.4 sec & 23.4 sec; sulfur smell

CTA FIELD DATA SHEET

PROJECT PBC - EIS Well ☒
INVESTIGATOR R. Hunter Point Source ☐

Samples to: (#)

Bact	Biol	Chem	Other
		7	

Starting Date

Day	Month	Year
8	Nov.	81

Sample Temp. (^oC)

Station No. SCMW-3

Starting Time (24) 1020

DO (mg/1)

Sample Depth (m) 15.5 feet

Ending Date

Day	Month	Year
8	Nov	81

Cond. (uMHOS/CM)

Lab Number MW-3-1020

Ending Time (24) 1043

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): 24.9 feet to bottom of well
6.9 feet to top of water
15.5 feet of hose in for pumping

SAMPLING ACTIVITY DESCRIPTION: Pumping srarted at 1025. Continued pumping to 1035 before sampling. A & B = one-gallon glass; C = one-liter glass; D = one-liter PP; E,F,G = 40-ml glass. Pumping rate: one gallon per 24.7 sec & 24.9 sec. Sulfur smell: Swale along south side of property which drains French Drain from MW-2 to MW - 3 along east and south side. Discharges to canal. Also drains residential area to south. Substantial flow.

CTA FIELD DATA SHEET

PROJECT PBC - EIS Well ☐
INVESTIGATOR R. Hunter Point Source ☒

Samples to: (#) Bact	Biol	Chem	Other	Starting Date Day	Month	Year	Sample Temp. (°C)
		7		8	Nov	81	

Station No.	Starting Time (24)	DO (mg/1)
SC-PP-FD-1	1 2 2 5	
Sample Depth (m)	Ending Date Day / Month / Year	Cond. (uMHOS/CM)
Surface	8 / Nov / 81	
Lab Number	Ending Time (24)	Turbidity (NTU)
FD-1-1225	1 2 4 5	
Type of Sample Grab / Composite / Other	pH	Other
Grab: X		

SAMPLE SITE DESCRIPTION (Map on Reverse): Sample taken at southwest corner of Percolation Pond enclosure where French Drain enters underground conduit

SAMPLING ACTIVITY DESCRIPTION: A&B = one-gallon glass bottles
C = one-liter glass bottle
D = one-liter PP bottle
E,F,G = 40-ml glass bottles

CTA FIELD DATA SHEET

PROJECT PBC - EIS
INVESTIGATOR R. Hunter

Well ☒
Point Source ☐

Samples to: (#)

Bact	Biol	Chem	Other
		7	

Starting Date

Day	Month	Year
7	Nov	81

Sample Temp. (°C)

Station No.

RW-1	

Starting Time (24)

1	5	5	4
1	5	5	9

DO (mg/1)

Sample Depth (m)

127 feet

Ending Date

Day	Month	Year
7	Nov	81

Cond. (uMHOS/CM)

Lab Number

8298-1544 ABCDEFG

Ending Time (24)

1	6	1	3

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): Private residence.
8298 SW-16th
127' deep—went to depth to avoid iron
2" PVC above ground—metal below
Gets some sulfur out of well

SAMPLING ACTIVITY DESCRIPTION: A,B—one-gallon glass
C—one-liter glass
D—one-liter pp
G,E,F—40-ml glass
Sulfur smell

CTA FIELD DATA SHEET

PROJECT PBC - EIS Well ☒
INVESTIGATOR R. Hunter Point Source ☐

Samples to: (#)

Bact	Biol	Chem	Other
		7	

Starting Date

Day	Month	Year
7	Nov	81

Sample Temp. (°C)

Station No.

RW-2

Starting Time (24)

1	6	3	7

DO (mg/1)

Sample Depth (m)

Unknown

Ending Date

Day	Month	Year
7	Nov.	81

Cond. (uMHOS/CM)

Lab Number

22905-1637-(A-G)

Ending Time (24)

1	6	5	2

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): 22905 SW 56th Ave—model home.
1½ PVC @ surface—unknown depth—looks similar to other private wells (RW-8298-16th).
Estimate 90-110 ft

SAMPLING ACTIVITY DESCRIPTION: A,B—one-gallon glass
C—one-liter glass
D—one-liter pp
E,F,G—40-ml glass
Less of a sulfur smell than 18298-16th—well flushed for seven minutes

CTA FIELD DATA SHEET

PROJECT PBC - EIS Well ☒
INVESTIGATOR R. Hunter Point Source ☐

Samples to: (#)

Bact	Biol	Chem	Other
		7	

Starting Date

Day	Month	Year
8	Nov	81

Sample Temp. (°C)

Station No. DWW-1

Starting Time (24)

0	8	4	5

DO (mg/1)

Sample Depth (m) 170 feet

Ending Date

Day	Month	Year
8	Nov	81

Cond. (uMHOS/CM)

Lab Number DW-1-0845

Ending Time (24)

0	8	5	9

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): Drinking water well #1—well closest to treatment plant; sample was taken directly from pumpline; well had been running during morning.

SAMPLING ACTIVITY DESCRIPTION: A,B = one-gallon glass

C = one-liter glass

D = one-liter PP

E,F,G = 40-ml glass

CTA FIELD DATA SHEET

PROJECT PBC - EIS
INVESTIGATOR R. Hunter

Well ☒
Point Source ☐

Samples to: (#)

Bact	Biol	Chem	Other
		7	

Starting Date

Day	Month	Year
8	Nov	81

Sample Temp. (^{o}C)

Station No.: DWW-5

Starting Time (24)

0	8	2	0

DO (mg/1)

Sample Depth (m): 116 feet

Ending Date

Day	Month	Year
8	Nov	81

Cond. (uMHOS/CM)

Lab Number: DW-5-0820

Ending Time (24)

0	8	3	5

Turbidity (NTU)

Type of Sample

Grab	Composite	Other
X		

pH

Other

SAMPLE SITE DESCRIPTION (Map on Reverse): Drinking water well #5-well closest to percolation ponds; sample taken directly from pumpline. Well had been running during morning.

SAMPLING ACTIVITY DESCRIPTION: A,B = one-gallon glass
C = one-liter glass
D = one-liter PP
G,E,F = 40-ml glass

7.0 APPENDICES

Appendix 7.3.2 Flow Readings (MGD) from Sandalfoot Cove WWTP - System #9.

Date	Time	Meter 3	Meter 4
7 Nov 81	1100	1.25	1.05
7 Nov 81	1200	1.175	1.05
7 Nov 81	1300	1.15	1.05
7 Nov 81	1400	1.10	*
7 Nov 81	1500	0.95	*
7 Nov 81	1600	0.90	*
7 Nov 81	1700	0.85	*
7 Nov 81	1800	0.95	*
7 Nov 81	1900	0.95	*
7 Nov 81	2000	0.90	*
7 Nov 81	2100	0.80	*
7 Nov 81	2200	0.75	*
7 Nov 81	2300	0.70	*
8 Nov 81	0000	0.70	*
8 Nov 81	0100	0.65	*
8 Nov 81	0200	0.60	*
8 Nov 81	0300	0.55	0.6
8 Nov 81	0400	0.55	0.6
8 Nov 81	0500	0.525	0.55
8 Nov 81	0600	0.55	0.6
8 Nov 81	0700	0.50	0.7
8 Nov 81	0800	0.80	0.9
8 Nov 81	0900	1.00	1.05
8 Nov 81	1000	1.075	1.15
8 Nov 81	1100	1.20	1.15

*No values meter malfunction. Flow assumed equal to meter 3.

7.0 APPENDICES

Appendix 7.3 Drinking Water Well Information.

Mason Well Drilling, Inc.
3328 N.E. 11th Avenue
Oakland Park, Florida 33334
564-3419

DW-1: -10"/cased to 160'-total depth 170'
0'-18' sand & rock
18'-40' sand
40'-50' sand
50'-90' sand
90'-102' rock
102'-115' rock & sand
115'-155' sand & rock
155'-170' rock

DW-2: 12"/cased to 105'-total depth 113'
0'-20' sand & rock
20'-85' sand
85'-100' rock & sand
100'-113' rock

DW-3: 12"/cased to 120'-total depth 129'
0'-20' sand & rock
20'-45' sand
45'-70' sand
70'-90' sand
90'-120' rock & sand
120'-129' rock

DW-4: 12"/cased to 109'-total depth 115'
0'-15' sand & rock
15'-40' sand
40'-65' sand
65'-80' sand
80'-105' rock & sand
105'-115' rock

DW-5: 12"/cased to 111'-total depth 116'
0'-15' sand & rock
15'-35' sand
35'-60' sand
60'-85' sand
85'-110' rock & sand
110'-116' rock

DW-6: 12"/cased to 111'-total depth 117'
0'-20' sand & rock
20'-45' sand
45'-65' sand
65'-90' sand
90'-110' rock & sand
110'-117' rock

DW-7: 12"/cased to 114'-total depth 126'
0'-20' sand & rock
20'-45' sand
45'-60' sand
60'-85' sand
85'-113' rock & sand
113'-126' rock

7.0 APPENDICES

Appendix 7.3.4 Precipitation Records for Sandalfoot Cove WWTP (inches/day).

Date	Amount	Date	Amount
1 Oct 81	0.00	21 Oct 81	0.00
2 Oct 81	0.00	22 Oct 81	0.00
3 Oct 81	0.00	23 Oct 81	1.30
4 Oct 81	0.00	24 Oct 81	0.00
5 Oct 81	0.00	25 Oct 81	0.00
6 Oct 81	0.15	26 Oct 81	0.00
7 Oct 81	0.00	27 Oct 81	0.00
8 Oct 81	0.00	28 Oct 81	0.20
9 Oct 81	0.00	29 Oct 81	0.00
10 Oct 81	1.05	30 Oct 81	0.25
11 Oct 81	0.00	31 Oct 81	0.30
12 Oct 81	0.00	1 Nov 81	0.10
13 Oct 81	1.60	2 Nov 81	0.20
14 Oct 81	0.10	3 Nov 81	1.50
15 Oct 81	0.00	4 Nov 81	2.25
16 Oct 81	0.00	5 Nov 81	0.00
17 Oct 81	0.00	6 Nov 81	0.00
18 Oct 81	0.00	7 Nov 81	0.00
19 Oct 81	0.00	8 Nov 81	0.00
20 Oct 81	0.00		

APPENDIX B: NITRATE MONITORING RECORDS

TABLE B-1

SOUTH PALM BEACH UTILITIES

SANDALFOOT COVE PLANT

Monitoring Well Dates

	Well #1	Well #2	Well #3
	(Nitrates - milligrams per liter)		
December 1980	2.06	4.28	5.87
August 1980	1.00	4.34	3.13
July 1980	2.60	1.7	6.3

TABLE B-2

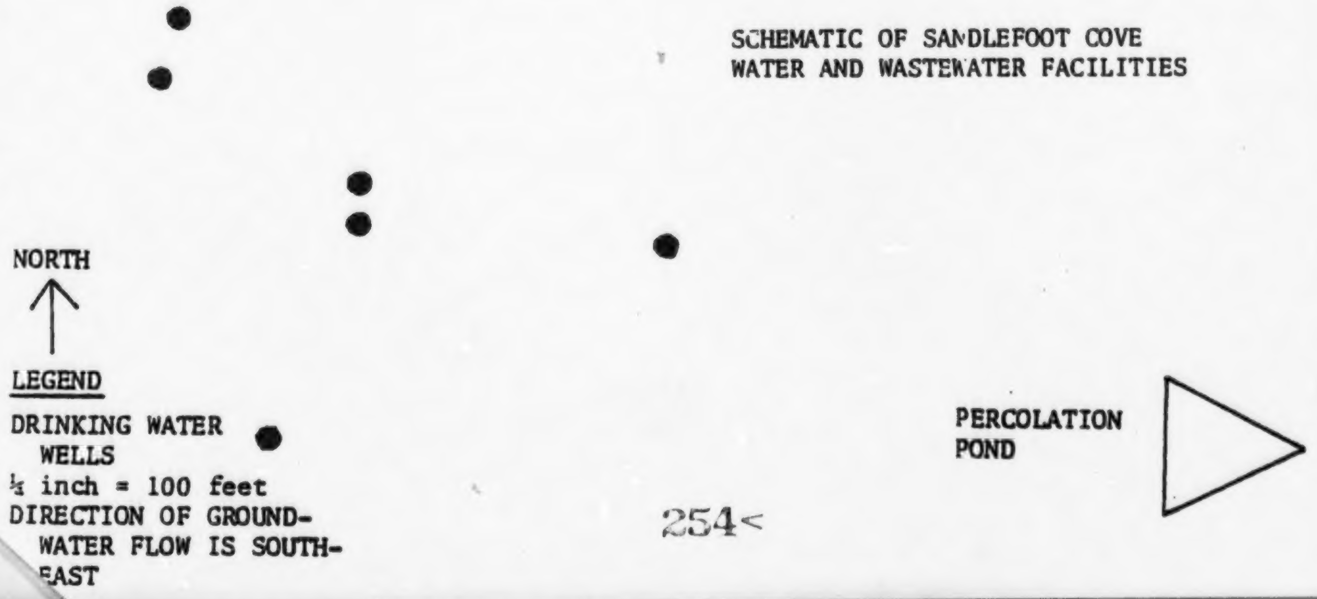
Sandlefoot Cove Drinking Water Well Monitoring Records

Nitrate Levels (mg/l)

Date	Well 1	Well 2	Well 3	Well 4	Well 5
4/13/77	0.03	LT0.01	LT0.01	0.02	LT0.01
10/24/77	0.09	0.06	0.06	0.24	0.02
2/14/78	LT0.01	LT0.01	LT0.01	LT0.01	0.29
9/1/78	0.12	LT0.01	LT0.01	0.26	LT0.01
2/15/79	LT0.01	LT0.01	LT0.01	LT0.01	LT0.01
9/13/79	LT0.01	LT0.01	LT0.01	LT0.01	LT0.01
3/6/80	0.10	*	0.10	0.10	0.10
9/18/80	0.29	0.29	0.33	0.33	0.36

LT less than

* No Measurement Recorded



SCHEMATIC OF SANDLEFOOT COVE WATER AND WASTEWATER FACILITIES

NORTH
LEGEND
DRINKING WATER WELLS
½ inch = 100 feet
DIRECTION OF GROUND-WATER FLOW IS SOUTH-EAST
PERCOLATION POND

TABLE B-3

Pheasant Walk Percolation Pond Monitoring Records
Nitrate Levels (mg/l)

Date	Well 1	Well 2	Well 3	Well 4
9/25/79	0.8	0.5	0.4	2.0
10/16/79	6.1	0.5	0.3	0.5
11/14/79	6.9	5.9	9.2	5.5
12/18/79	2.7	0.5	0.2	0.2
1/15/80	1.1	3.0	2.8	0.9
2/11/80	0.7	0.1	0.5	0.8
3/9/80	0.8	0.1	0.5	0.2
4/16/80	1.9	1.0	0.2	0.6
5/13/80	4.8	0.5	0.7	0.4
6/10/80	7.1	*	*	*

* No Measurement Recorded

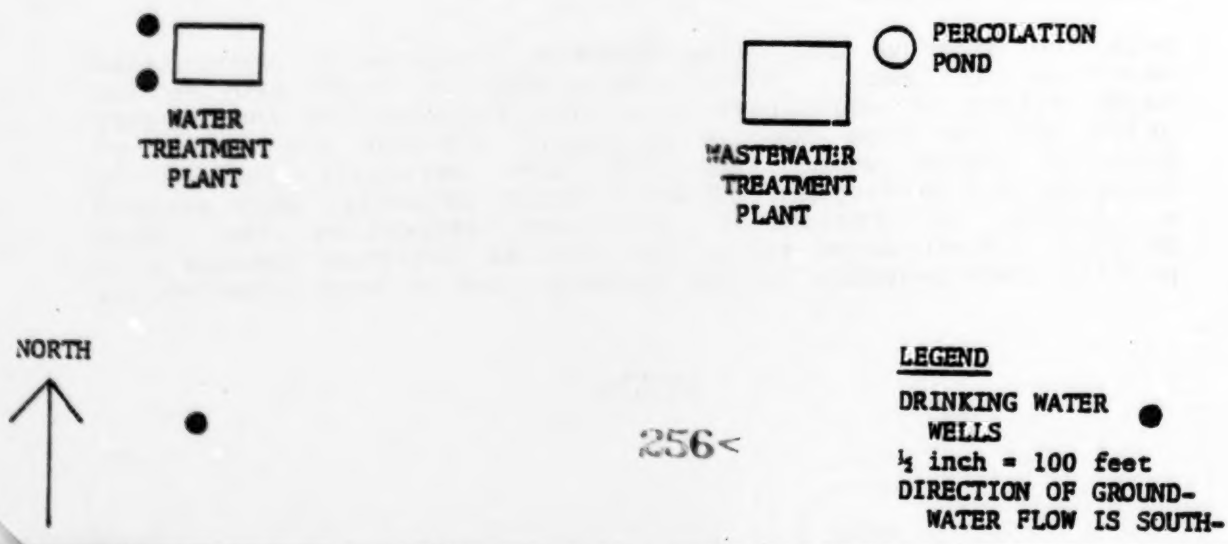
TABLE B-4

Pheasant Walk Drinking Water Well Monitoring Records
Nitrate Levels (mg/l)

Date	Well 1	Well 2	Well 3
9/77	3.2	7.1	*
9/78	2.6	2.6	4.4
3/79	3.9	7.9	*
4/79	0.2	0.2	0.1
9/79	7.9	3.1	*
3/80	3.6	*	*
4/80	*	*	4.3

* No Measurement Recorded

SCHEMATIC OF PHEASANT WALK WATER AND WASTEWATER FACILITIES


WATER TREATMENT PLANT
WASTEWATER TREATMENT PLANT
PERCOLATION POND
NORTH
LEGEND
DRINKING WATER WELLS ●
½ inch = 100 feet
DIRECTION OF GROUND-WATER FLOW IS SOUTH-

APPENDIX C - WILDLIFE OF SOUTH PALM BEACH COUNTY

Common terrestrial mammals that are likely to occur throughout the project area are Virginia opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), hispid cotton rat (*Sigmodon hispidus*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), and raccoon (*Procyon lotor*). Examples of reptiles which occupy various habitats are green anole (*Anolis carolinensis*), glass lizards (*Ophisaurus* spp.), yellow rat snake (*Elaphe obsoleta quadrivittata*), and eastern coral snake (*Micrurus fulvius fulvius*). Mouring dove, bobwhite, and starling are examples of birds that may be found in many of the vegetative communities.

Whereas the species described above are typically found in a variety of habitats, other organisms such as the Florida mouse (*Peromyscus floridanus*), Florida scrub lizard (*Sceloporus woodi*), Atlantic loggerhead (*Caretta caretta caretta*), and scrub jay are normally found only in a single habitat type.

Except for a very limited amount of quail, deer, and waterfowl hunting, none of the terrestrial species are of direct economic importance, and the Florida Game and Fresh Water Fish Commission does not actively manage wildlife in the project area.

The AIWW and adjacent finger canals provide habitat for numberous estuarine and marine fish and benthic species.

Many of the species present such as sheepshead (*Archsargus probatocephalus*), jack crevalle (*Caranx hippos*), snook (*Centropomus pectinatus*), ladyfish (*Elops saurus*), tarpon (*Melgalops atlantica*), croaker (*Micropogon undulatus*), flounder (*Syacium* spp.) and pompano (*Trachinotus* spp.) are economically important as food or game fish for sport fishermen. Additionally, two mammaliam species are present from time to time--the bottle-nosed dolphin (*Tursiops* truncatus) and the endangered manatee.

Both the Mangrove and Maine Grass Bed vegetative communities occur in salt water. These two vegetative types provide the major extent of vegetative cover for reproductive and nursery areas for the fish species present. Although the extent of both of these communities has been seriously reduced by dredging and development of water front property, both perform a variety of ecological functions supporting the fauna present. Plant material in the form of detritus covered with protein rich bacteria is the primary food of many invertebrate species such as worms and crustaceans (shrimp and crabs), which in turn are eaten by larger organisms, such as sheephead, Altantic croaker, and flounder. The plants also provide cover for egg laying and protection from predators.

Benthic (bottom) habitats support a variety of invertebrate species. The substrate in these habitats is typically sandy to silty, and vegetation may be sparse or dense. The density of benthic organisms present ranges to over 500 organisms per quarter square meter, and lowest densities occur in the finger canals benthic organisms present are *Paraprionospio pinnata*, *Streblospio benedict*, *Ampelicca abdicta*, *Grandidierella bonnieroides*, and *Mulina lateralis*. Oysters are present in harvestable quantities, and clams to a lesser extent, but due to unpredictable bacteria levels, collection is illegal. Crabs in limited amounts are caught for human consumption.

The extensive canal system of the area serves as the most important freshwater fishery in the Planning Area, although biological productivity is relatively low. In descending order, the primary species caught by fishmermen are bream, including warmouth (*Lepomis* spp.), catfish (*Ictalus* spp.), largemouth bass (*Micropterus salmoides*), redfin pickerel (*Esox americana americana*), gars (*Lepisosteus* spp.), and mudfish or bowfin (*Amia calva*). However, the Florida Game and Fresh Water Fish Commission does not manage the fishery resources in the canals.[7]

The primary groups of benthic organisms in the mucky, peaty substrate of the canals are amphipods, gastropods, and aquatic insects such as dragonflies and damselflies. Although water quality varies greatly over an area the size of Southern Region Palm Beach County 201 Area, the benthos indicate that water quality is fairly good.

A list of rare, threatened, and endangered species that may occur in the Southern Region Palm Beach County 201 Area is presented in Table C-1. Many of the organisms in the list are ecologically restricted by fairly strict habitat requirements and have not been able to successfully cope with habitat modification, habitat loss, and/or man's presence. Many of the species in Table C-1 require habitats either in or adjacent to water (mangroves, beaches, marshes, etc.) or the dry, sandy scrub of the coastal ridge.

TABLE C-1

ENDANGERED AND THREATENED SPECIES OF THE SOUTHERN REGION PALM BEACH COUNTY 201 AREA

Species	Federal status[a]	State status[b, c]	Habitat and local status[d]
ANIMALS			
Florida gopher frog (*Rana areolata aesopus*)	----	Species of Special Concern	Sand Pine scrub habitats; range includes the project area.
Atlantic green turtle (*Chelonia mydas mydas*)	Endangered	Endangered	Marine and coastal strand; nests on beach strand of the project area during summer months.
Gopher tortoise (*Gopherus polyphemus*)	----	Species of Special Concern	Sand pine scrub, hammocks; historic range includes the study area.
Atlantic loggerhead (*Caretta caretta caretta*)	Threatened	Threatened	Marine and coastal strand; nests on beach strand of the project area during summer months.
American alligator (*Alligator mississippiensis*)	Threatened	Species of Special Concern	Marshes, swamps; relatively abundant in Florida
Peregrine falcon	Endangered	Endangered	Marshes, ponds, sloughs; winter resident.
Brown pelican	Endangered	Threatened	Marine and estuarine waters; although a permanent resident, it does not nest in Palm Beach County.
Bald eagle	Endangered	Threatened	Marshes, ponds, sloughs; does not nest in Palm Beach County.

TABLE C-1 (Continued)

Species	Federal status[a]	State status[b, c]	Habitat and local status[d]
American kestrel	----	Threatened	Semi-open areas; permanent resident of Palm Beach County.
American oystercatcher	----	Species of Special Concern	Coastal beaches, mudflats; rare locally along Florida's east coast.
Least tern	----	Threatened	Coastal beaches; nests colonially in Palm Beach County.
Florida scrub jay	----	Threatened	Oak scrub habitats; reported to inhabit Boca Raton area.
Roseate spoonbill	----	Species of Special Concern	Coastal bays, brackish ponds; does not nest in Palm Beach County.
Sherman's fox squirrel (*Sciurus niger shermani*	----	Species of Special Concern	Pine flatwoods; its range extends southward to the Boca Raton area.
Florida mouse (*Peromyscus floridana*)	----	Threatened	Sand pine scrub; recorded just north of Boca Raton.
Manatee (*Trichechus manatus latirostris*)	Endangered	Endangered	Marine, estuarine, and fresh waters. Observed in C-15 and Hillsboro Canals.[e]
PLANTS			
Leather fern (*Acrostichum danaeaefolium*)	----	Threatened	Reported from swamps, marshes, and mangrove swamps in the project area.

TABLE C-1 (Continued)

Species	Federal status[a]	State status[b, c]	Habitat and local status[d]
Bay cedar (*Suriana maritima*)	----	Threatened	Reported from coastal dune-dry sand habitats in the project area.
Shield fern (*Thelypteris interrupta*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Shield fern (*Thelypteris normalis*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Shield fern (*Thelypteris reticulata*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Air-plant (*Tillandsia balbisiana*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Air-plant (*Tillandsia fasciculata*)	----	Endangered	Reported from swamp and low hammock habitats in the project area.
Air-plant (*Tillandsia utriculata*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Sea-lavender (*Tournefortia gnaphalodes*)	----	Threatened	Reported from coastal dune-dry sand habitats in the project area.
Shoestring fern (*Vittaria lineata*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Coontie (*Zamia integrifolia*)	----	Threatened	Reported from pine/oak scrub habitats in the project area.

TABLE C-1 (Continued)

Species	Federal status[a]	State status[b, c]	Habitat and local status[d]
Pondapple (*Annona glabra*)	----	Threatened	Reported from swamps in the project area.
Blechnum fern (*Blechnum serrulatum*)	----	Threatened	Reported from low hammock, pine flatwoods-dry prairie, and wet prairie habitats in the project area.
Lance fern (*Campyloneurum phyllitidis*)	----	Threatened	Reported from low hammock and swamp habitats in the project area.
Sand cedar (*Ceratiola ericoides*)	----	Threatened	Common in pine-oak scrub in the project area.
Shell orchid (*Encyclia tampensis*)	----	Threatened	Reported from swamp habitats in the project area.
Redberry (*Eugenia confusa*)	----	Threatened	Reported from coastal hammock habitats in the project area.
Dahoon (*Ilex cassine*)	----	Threatened	Reported from swamp habitats in the project area.
Golden polypody (*Phlebodium aureum*)	----	Threatened	Occurs in coastal hammock, low hammock, and swamp habitats of the project area.
Resurrection fern (*Polypodium polypodioides*)	----	Threatened	This abundant species is known from swamps and low hammocks in the project area.
Palmetto (*Sabal palmetto*)	----	Threatened	This abundant species occurs in coastal hammocks, low hammocks, and swamps in the project area.
Scaevola (*Scaevola plumieri*)	----	Threatened	Reported from coastal dune-dry sand habitats in the project area.

Three species which are on the federal list of endangered species either reproduce or are permanent residents in the Planning Area--the Atlantic green turtle (*Chelonia mydas mydas*), the brown pelican, and the manatee. Two endangered birds, the peregrine falcon and bald eagle, probably occur in the area intermittently. In addition to the endangered species, two threatened species occur. The Atlantic loggerhead (*Carretta caretta caretta*) nests on the beaches, and the American alligator (*Alligator mississippiensis*) is a permanent resident in canals, swamps, and marshes.

The remaining animals in Table C-1 are classified as threatened or of special concern in the state of Florida (Florida Statutes Chapter 39-27). These species are provided legal protection by the Florida Endangered and Threatened Species Act of 1977, as well as such individual acts as the Florida Panther Act, Florida Manatee Sanctuary Act and Endangered and Threatened Species Trust Fund Act. These laws prohibit any activity which may be detrimental to listed species unless authorized by permit from the Florida Game and Fresh Water Fish Commission.

The federal list of endangered species names no endangered and no threatened plants for the Planning Area (U.S. Fish and Wildlife Service, Department of the Interior 1979a, 1979b). However, a number of plant species that are likely to occur in the Planning Area are protected by the Preservation of Native Flora of Florida (Florida Statutes Chapter 78-72, Section 1, Section 581.185).